# TECHNICAL APPENDIX FOR THE NOISE ELEMENT OF THE REDDING GENERAL PLAN (1980 – 2000) AND PROPERTY OWNERS NOISE ABATEMENT MANUAL



ADOPTED BY THE CITY COUNCIL
ON JUNE 17, 1985, PURSUANT
TO RESOLUTION NO. 85-118

PREPARED BY
DEPARTMENT OF PLANNING & COMMUNITY DEVELOPMENT

MAY 1985

RESOLUTION NO. 85-118

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDDING AMENDING THE GENERAL PLAN OF THE CITY OF REDDING BY ADOPTING A NEW NOISE ELEMENT.

WHEREAS, following the required public hearings therefor, the Planning Commission of the City of Redding has recommended to the City Council that the Noise Element of the City's General Plan be amended by adopting a new Noise Element; and

WHEREAS, following the required notices in accordance with law, the City Council has held public hearings on said recommendations and has carefully considered the evidence at said hearings;

NOW, THEREFORE, BE IT RESOLVED as follows:

1. The City Council has reviewed and approved the Negative Declaration on the plan, finding that there was no significant impact on the environment.

2. The City Council does hereby delete the existing Noise Element of the General Plan of the City of Redding and adopt the new Noise Element as shown in Exhibit "A" attached hereto.

I HEREBY CERTIFY that the foregoing resolution was introduced and read at a regular meeting of the City Council of the City of Redding on the 17th day of June , 1985, and

was duly adopted at said meeting by the following vote:

| | | |
|---|---|---|
| AYES: | COUNCIL MEMBERS: | Fulton, Gard, & Pugh |
| NOES: | COUNCIL MEMBERS: | None |
| ABSENT: | COUNCIL MEMBERS: | Demsher & Kirkpatrick |
| ABSTAIN: | COUNCIL MEMBERS: | None |

/s/ Barbara Allen Gard
BARBARA ALLEN GARD, Vice Mayor
City of Redding

ATTEST:

/s/ Ethel A. Nichols
ETHEL A. NICHOLS, City Clerk

FORM APPROVED:

/s/ Randall A. Hays
RANDALL A. HAYS, City Attorney

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# I. INTRODUCTION

## A. PURPOSE

The purpose of the Noise Element of the Redding General Plan is to provide a basis for comprehensive local programs to control and abate excessive noise levels, and to protect people from excessive noise exposure. The Noise Element is a guideline for use in the administration of the "Land Use Element" to achieve compatible land use and also to provide base line levels of noise for local noise enforcement.

## B. AUTHORITY

The Noise Element was prepared pursuant to Section 65302(g) of the Government Code and the "General Plan Noise Element Guidelines," prepared by the State Office of Planning and Research. The Noise Element was also prepared in accordance with the Airport Noise Standards of California outlined in the California Administrative Code, Title 21 and the Noise Insulation Standards of California Administrative Code, Title 25.

## C. SCOPE

Of all the nine State-mandated general plan elements, the scope of the Noise Element, as set forth by the Government Code, is the most specific in content and method of preparation. The Noise Element must include an environmental noise analysis of the following:

1. Highways and freeways.

2. Primary arterials and major local streets.

3. Passenger and freight on-line railroad operations and ground rapid-transit systems.

4. Commercial, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operations.

5. Local industrial plants including, but not limited to, railroad classification yards.

6. Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.

The Noise Element also includes a community noise exposure inventory, which identifies the degree to which people are exposed to excessive levels of noise throughout the community. The Element also recommends measures and possible solutions to mitigate existing and foreseeable noise problems. In addition, the Noise Element further specifies goals, objectives and standards to be implemented through zoning and other land-use control tools.

## D. HOW TO USE APPENDIX AS A GUIDE TO NOISE ABATEMENT

The Technical Appendix to the Noise Element is designed to aid developers and City staff in determining if a noise problem exist for proposed projects; and if so, what type of noise mitigations may be needed. The checklist procedure below should be helpful in quickly finding specific noise information in the appendix based on the land use of the project, location and the project's noise characteristics:

1. Will the project be exposed to excessive noise or will the project cause excessive noise for residential or noise sensitive uses?

Step 1: Determine the maximum recommended noise-level standard based on the applicable land-use category of the project. If the project may cause excessive noise levels for adjacent residential land use or noise sensitive uses, then the appropriate category for these should be responded to.

LAND USE CATEGORIES

___ COMMERCIAL: The maximum recommended noise level is _____ CNEL (Refer to Table 5, page 19 and Section VII B (2) c, e, and h on page 61.)

___ INDUSTRIAL: The maximum recommended noise level is _____ CNEL. (Refer to Table 5, page 19 and Section VII B(2)d.)

___ RESIDENTIAL: The maximum recommended noise level for the exterior is _____ CNEL and for the interior ___ CNEL. (Refer to Section VII, B(D) Table 5, and Section III B (2-L).

___ NOISE SENSITIVE: The maximum recommended noise use (i.e. hospitals, schools, and rest homes) level for the exterior is ___ CNEL and for the interior ___ CNEL.

Step 2: Estimate existing and projected noise contour levels according to the following applicable noise sources:

___ TRAFFIC & : LAND-USE ACTIVITIES — Write in the closest noise contour interval to the property line of the project.
____ Estimated Existing CNEL
____ Estimated Projected CNEL
(Refer to Tables 6 - 12 on pages 84 to 90.)

___ TRAIN: OPERATIONS — Write in the closest noise contour interval to the property line of the projects.
____ Estimated CNEL
(Refer to Table 26, page 26.)

___ AIRPORT: OPERATIONS — Write in the closest noise contour interval to the property line.
____ CNEL
(Refer to Map Exhibits D & E on pages 33 & 34 for Benton Airpark and Map Exhibits B & C on pages 31 & 32 for Redding Municipal Airport.)

___ NOISE LEVEL NOT QUANTIFIED IN APPENDIX: If the Appendix provides no noise data to estimate the existing or projected noise level then a noise monitoring may be needed. (Refer to Section 2-K, page and Table 24, page 24.)

Step 3: To estimate the existing and projected noise level at the property line of the project or other land-use affected by the project using the estimated noise contour interval information of Step 2, you should apply the noise characteristic adjustments listed on page 5. Write in the adjusted noise levels below:

___ Estimated Adjusted Existing CNEL
___ Estimated Adjusted Projected CNEL

Step 4: To determine if the project will be exposed to excessive existing or projected noise levels, you should compare the recommended maximum noise level of Step 1 to the estimated noise level of Step 3. If the maximum recommended noise level is exceeded, then further noise analysis is needed along with possible noise mitigations. To determine if the project will cause excessive noise levels for residential noise sensitive uses, you should perform the same comparison as noted above using the appropriate maximum recommended levels from Step 1. Write in the amount of noise level that exceeds the recommended levels.

Existing:
___ CNEL, exterior ___ CNEL, interior (if applicable)

Projected:
___ CNEL, exterior ___ CNEL, interior (if applicable)

Step 5: If it is determined from the previous procedure that noise mitigations are necessary, then proceed to the following section on noise mitigations:

2. HOW TO SELECT NOISE MITIGATIONS.

1. If the projected exterior noise levels of Step "A" exceed the maximum interior recommended noise levels identified below by more than 15 db then refer to Tables 31 to 38, page 76.

___ For sleeping areas of dwelling unit or noise-sensitive use, the maximum level is 40 db.
___ For habitable areas of dwelling unit or noise-sensitive use, the maximum level is 45 db.

The engineered application of the noise reductions of these tables should be verified by the procedures published in "Evaluation of Noise Reduction of Building Facades and Outdoor Noise Barriers" prepared by the State Office of Noise Control.

If the S.T.C classifications are used in determining noise reductions of materials, then the calculations shall be verified by the formulas set forth in the Handbook of Noise Control, second edition, New York (McGraw Hill) 1979.

Both of these documents are available from the Redding Planning Department.

2. If, in addition to the building-noise mitigations of Tables 31 to 38, it is desirable to provide greater-noise attenuation by sound walls, then refer to the Table 30, page 44, and Figures 11 - 16 on pages 48 to 50.

## II. NOISE CHARACTERISTICS

Noise is simply an unwanted sound. It can be measured by various types of monitoring equipment, which are based on the fact that noise and other forms of sound are caused by vibrations in the air pressure around its steady state atmospheric value. It is these vibrations that the human ear receives and translates to the brain.

Such vibrations in the case of noise are characterized by rapidly changing frequencies from about 20 cycles per second to 20,000 cycles per second. The decibel (db) is the unit of measure used to plot sound pressure. The sound pressure level in db is mathematically defined by the relationship:

$$\text{Sound Pressure Level (db)} = 20 \log \frac{P}{P_0}$$

Where P is the measured pressure and $P_0$ is the reference pressure. For example:

If $P_0 = 0.0002$, then for $P = 0.0002$, the sound pressure level of 0 db.

If $P = 2{,}000$, then the sound pressure level is 140 db.

Zero db corresponds to the threshold of hearing and 140 db is typical of the noise produced by a large aircraft jet engine. Most community noise is between these two extremes.

The decibel scale is a base ten logarithmic scale ranging from 0 to 140. Each increase of ten decibels increases the sound-pressure level ten times. Thus, at 20 db, the sound intensity is ten times that of ten decibels. The faintest whisper of a sound that can be heard by a healthy, young human being is equivalent to zero decibels. Normal conversation is generally in the 60 db range.

Since the human ear is not as sensitive to the sounds of the lower frequencies as to higher, a scale has been developed that filters out these frequencies and perceives noise in much the same way the human ear does; this is the "A" decibel scale.

Following is a chart listing various sound levels that can be encountered within the community.

TABLE 1

NOISE LEVEL OF COMMON SOUNDS

| Sound | Sound Level (A) | Relative Loudness (Approximate) | Relative Sound Energy |
|---|---|---|---|
| Jet Plane, 100 feet | 130 | 128 | 10,000,000 |
| Rock Music with Amplifier | 120 | 64 | 1,000,000 |
| Thunder, Danger of Permanent Hearing Loss | 110 | 32 | 100,000 |
| Boiler Shop, Power Mower | 100 | 16 | 10,000 |
| Orchestral Crescendo at 25 ft., Noisy Kitchen | 90 | 8 | 1,000 |
| Busy Street | 80 | 4 | 100 |
| Interior of Department Store | 70 | 2 | 10 |
| Ordinary Conversation at three feet | 60 | 1 | 1 |
| Quiet Car at Low Speed | 50 | 1/2 | .1 |
| Average Office | 40 | 1/4 | .01 |
| City Residence | 30 | 1/8 | .001 |
| Quiet Country Residence | 20 | 1/16 | .0001 |
| Rustle of Leaves | 10 | 1/32 | .00001 |
| Threshold of Hearing | 0 | 1/64 | .000001 |

Source: U.S. Department of Housing and Urban Development, Aircraft Noise Impact, Planning Guidelines for Local Agencies, November, 1972

The characteristics of noise presented below are important in that they suggest ways that mitigation measures can be applied to control noise propagation or considerations that should be looked for when dealing with existing and potential noise sources and problems.

1. Noise can best be shielded by or reflected by barriers with a minimum mass of four pounds per square feet.

2. Noise gets quieter with increasing distance from the source, but not at a linear rate. Doubling the distance only decreases the sound level 4 db on collector roads and 6 db on major arterials, not by one-half. (Source: Caltrans.)

3. Doubling the sound power will cause the sound pressure to increase by 3 db, and vice versa. (Source: Caltrans.)

4. Noise is not perceived in direct proportion to the sound level. A 10 db change is perceived as twice as loud or half as loud depending on the initial noise level.

5. In general, for every doubling of the average daily traffic volume a 3 db(A) increase in the Community Noise Equivalent level (CNEL) will occur. (Source: State Department of Health.)

6. For every foot increase in height above the blocked line of sight of a noise source, a 1 db reduction will occur. (Source: Buntin and Associates, Acoustical Consultants, Carmichael, California.)

7. Conventional single-family construction with some windows open will provide approximately 15 db noise reduction and with the windows closed a reduction of 20 db may be achieved. The latter assumes either a forced ventilation or air-conditioning system. (Source: State Office of Noise Control.)

8. To be effective, green belts of trees must be at least 50 feet tall; must be a continuous strip 75- to 100-feet wide; must have dense foliage down to the ground; and must be evergreen so that the protection is effective year-round. This type of stand takes 20 years to mature, is extravagant in terms of required land area, and is useless against elevated sources such as aircraft or for protecting multiple-story dwellings. (Source: Caltrans, District 2 Office, Redding.)

9. The sound transmission class (STC) for the evaluation of traffic noise is assumed to be equal to the ambient "A" weight noise level minus 4 decibels (Source: State Office of Noise Control.)

## DEFINITIONS

Ambient Noise Level: The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Intrusive Noise: That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency and time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

Equivalent Energy Level Leq: The sound level corresponding to a steady state sound level containing the same total energy as a time varying signal over a given sample period. Leq is typically computed over 1, 8, and 24 hour sample periods. When there are no unusual noise conditions, such as infrequent peak noise, then the leq must be approximated by a 15-minute monitoring period.

CNEL: Community Noise Equivalent level. The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 p.m. to 10 p.m. and after addition of 10 decibels to sound levels in the night before 7 a.m. and after 10 p.m.

## III. HUMAN RESPONSE TO NOISE

Noise that permeates our environment to the extent that it irritates the general public may be termed "noise pollution." The Environmental Protection Agency has reported that 80 million Americans are affected in some adverse way by noise pollution. Hearing damage starts at 85 db depending on duration and frequency of exposure; however, some authorities believe damage begins as low as 70 db. Noise is known to cause errors in observation and impair time judgment at the 90 db level. According to many medical and legal sources cited in the Noise Element of Los Angeles County, the effects of excessive noise can be place in four categories each of which is discussed below:

1. Physiological

   Exposure to sufficient levels of noise for long periods of time can produce temporary or permanent loss of hearing. In general, sound levels must exceed 80 db for sustained periods before hearing loss occurs. The greater or longer the exposure, the greater the potential for hearing loss. Other physical effects of noise may be rapid heart beat, blood vessel constriction, dilation of the pupils, paling of the skin, headaches, muscle tension, nausea, insomnia, and fatigue. If the noise is of sufficient level, the stomach, esophagus, and intestines may be seized by spasms.

2. Psychological

   Noise can interfere with sleep. Excessive exposure to noise may also cause symptoms of anxiety, anger, vertigo, hallucinations, and, in extreme cases, has even been blamed for homicidal and suicidal tendencies. It has not been scientifically proven, however, that noise is the primary cause of these symptoms.

3. Sociological

   Adaptions to noise intrusions may adversely affect group interrelationships. The intrusion of noise can effect every facet of human existence--from one's family life to one's occupational, educational, recreational, and religious activities. The possible adverse effects of man's individual reactions to noise, his physical and emotional maladies, may be compounded in the group situation. More importantly though, noise may threaten the ability to communicate and to comprehend. For example, children who live or attend school near sources of excessive noise can be handicapped not only in their learning process but also in their socialization process.

4. Economic

   The costs of adverse noise impacts and mitigation are appreciable and include medical care, loss of efficiency and production, reduction of property value, avigation easements, litigation, abatement measures, and increased vacancies.

# IV. SELECTION OF LAND USE NOISE STANDARDS

Before a discussion of community noise goals and objectives can occur, a determination of the maximum allowable land-use noise standards must be made. Noise standards are typically divided into three land-use categories: (1) residential, (2) commercial, and (3) industrial. The following discussion addresses each of these categories based on State and Federal requirements, community reaction to excessive noise and the City's existing noise environment. The selected noise metric for the noise standards is "Leq" or "equivalent energy level." This noise metric essentially adds up all of the noise levels during a 1-, 8-, or 24-hour period and spreads the cumulated noise level evenly over the duration of the monitoring period. The Leq noise metric was principally selected because, through mathematical conversion, it is approximately comparable to State and Federal noise metrics (CNEL and Ldn) and because it can be easily checked for compliance with the City's noise monitoring equipment.

## A. MAXIMUM RESIDENTIAL STANDARDS

### 1. State Residential Noise Standards

a. The Base-line criteria used by the State in determining when a local agency must require an acoustical noise analysis is the 60 CNEL or Ldn noise contour. This criteria, as it pertains to the City, is discussed in the following excerpt from Title 24 of the Housing and Community Development Building Regulation:

HOUSING AND COMMUNITY DEVELOPMENT TITLE 24
(Register 78, No. 26—7-1-78)

*(1) **Location and Orientation.** Consistent with land use standards, residential structures located in noise critical areas, such as proximity to select system of county roads and city streets (as specified in 186.4 of the State of California Streets and Highways Code), railroads, rapid transit lines, airports, or industrial areas shall be designed to prevent the intrusion of exterior noises beyond prescribed levels with all exterior doors and windows in the closed position. Proper design shall include, but shall not be limited to, orientation of the residential structure, set-backs, shielding, and sound insulation of the building itself.*

*(2) **Interior Noise Levels.** Interior community noise equivalent levels (CNEL) with windows closed, attributable to exterior sources shall not exceed an annual CNEL of 45 dB in any habitable room.*

*(3) **Airport Noise Source.** Residential structures to be located within an annual CNEL contour (as defined in Title 4, Subchapter 6, California Administrative Code) of 60 require an acoustical analysis showing that the structure has been designed to limit intruding noise to the prescribed allowable levels. CNEL's shall be as determined by the local jurisdiction in accordance with its local general plan.*

*(4) **Vehicular and Industrial Noise Sources.** Residential buildings or structures to be located within annual exterior community noise equivalent level contours of 60 dB adjacent to the select system of county roads and city streets (as specified in Section 186.4 of the State of California Streets and Highways Code), freeways, state highways, railroads, rapid-transit lines and industrial noise sources shall require an acoustical analysis showing that the proposed building has been designed to limit intruding noise to the allowable interior noise levels prescribed in Section T25-28(e)(2). Exception: Railroads, where there are no nighttime (10:00 p.m. to 7:00 a.m.) railway operations and where daytime (7:00 a.m. to 10:00 p.m.) railway operations do not exceed four (4) per day.*

b. The California Administrative Code (Title 21) also stipulates the maximum allowable noise exposure for residential areas near airports as 65 CNEL.

2. Federal Residential Noise Standards

a. The noise contour interval used by U. S. Department of Housing and Community Development (HUD) in determining the maximum allowable level for Federally assisted projects that may affect residential uses is 65 CNEL, as noted below:

Federal Site Acceptability Standards
For Housing Projects

| | | |
|---|---|---|
| Acceptable..... | Not exceeding 65 db(1)..... | None |
| Normally Unacceptable.. | Above 65 db but not exceeding 75 db.. | Special Approvals Environmental Review, Attenuation |
| Unacceptable..... | Above 75 db..... | Special Approvals Environmental Review, Attenuation |

3. Interior Residential Noise Standards

One of the principle reasons why the State has chosen a maximum exterior noise level of 60 db as being reasonable standard for residential areas including multiple family is because most conventional dwellings (with some windows open) under California building codes will reduce an exterior 60 db noise level to an interior level of 40-45 db. Except for sleeping areas, this is a typical interior noise level for most dwellings.

According to the State Office of Noise Control, exterior noise levels of 65 db and above require special construction standards to achieve an interior noise level of 40-45 db even with all the windows closed. It is for these reasons that most communities have selected 60 db as the maximum exterior daytime (7 a.m. to 10 p.m.) noise level.

For the nighttime exterior noise level (10 p.m. - 7 a.m.), most communities have selected 50 db because it can be reduced to an interior noise of 35 db, which is the desired noise level for sleeping areas.

4. Community Reaction to Various Residential Noise Levels

In an attempt to further clarify what is an acceptable residential noise standard, the U. S. Environmental Protection Agency (EPA) conducted a survey of 104 cities to determine what noise land-use standards are most commonly used. Figure 1 plots the results of EPA's survey and illustrates that the majority prefer a maximum exterior daytime Leq of 55 db. Both of these standards satisfy the State and Federal standards presented above.

In another survey conducted by the Federal Interagency Committee, as shown on Table 2, on Urban Noise, only 9 percent of the population would object to an Ldn of 60 db; and 15 percent would object to an Ldn of 65 db. The survey also notes that at 70 db hearing loss is likely to occur and 37 percent of the population would object to this volume of noise.

Aside from being unhealthy, community reaction to excessive noise levels may result in long-term public controversy, and in some cases, lead to expenditure of public funds to construct sound walls or possible forcing the relocation of some business if the noise mitigation is too costly.

5. Existing Residential Noise Levels For Redding

Existing day and nighttime residential noise levels for the Redding area were graphed from the data listed in Tables 13 through 22 on pages 92 through 101. Figures 2 and 3 on page 16 illustrates that most daytime Leq noise levels at 100 feet from the edge of the pavement fell between 50 and 65 db with an average of 60 db. Most of the nighttime Leq noise levels fell between 44 and 62 db with an average of 53 db.

The day and nighttime averages of 60 and 53 db are representative of what single-family and multiple-family residents are exposed to along most major four-lane streets in Redding. Interior day and nighttime neighborhood noise levels for these same uses are about 7 to 10 db quieter. Even though this is the case, it is believed that the land-use noise standards should be developed around the noise levels of major streets because of the community-wide noise impact of vehicular traffic on major streets.

Table 4 on page 15 provides a comparison of County, City, State and Federal standards. The Table briefly summarizes the foregoing discussion and points out that the City's existing noise environment is in general quieter than the standards of most urbanized cities. Based on the existing noise environment of the City, it is recommended that the maximum daytime (7 a.m. - 10 p.m.) Leq noise level for single-family and multiple-family zoning districts should be 60 db and the maximum nighttime (10 p.m. - 7 a.m.) Leq noise levels should be 50 db. Both of these noise standards should not be exceeded at a distance of 100 feet from the edge of the pavement. Beyond the 100-foot point the noise-level standards should not be exceeded at the property boundary adjoining commercial or industrial uses.

It should be noted that the recommended standards cannot be compared to the Noise Element Standards adopted in 1974, because those standards are based on an ambient noise level metric which by definition excludes the consideration of peak noise levels. This noise metric is no longer acceptable by the State General Plan Noise Element Guidelines.

The recommended standards were reviewed by the Office of Noise Control, State Department of Health and are consistent with State and Federal requirements for highways and airports. They generally reflect what most people expect in a noise environment and they are not likely to

evoke community controversy. The standards also represents the first line of defense in protecting the quieter residential neighborhoods removed from the noise levels of major streets and from industrial-commercial noise sources.

## B. COMMERCIAL AND INDUSTRIAL STANDARDS

The consideration of noise standards for industrial and commercial zoning is less critical because noise levels for these land-use types can be much louder without generating public objection. The exception to this is when residential uses are intermixed with commercial or industrial uses, or when the noise levels spill over into residential zoning districts. Hotel and motel uses in commercial areas may be affected, but occupants usually accept higher noise levels for these uses as a temporary nuisance.

Figures 3 and 4 on pages 16 and 17 graphically summarize a survey of over 100 cities by E.P.A. of maximum allowable noise levels for industrial and commercial uses. Figure 4 suggests that for industrial land use, most cities prefer a maximum day and nighttime Leq of 70 db. For commercial land use, Figure 5 suggests that most cities prefer a maximum daytime Leq of 60 db and maximum nighttime Leq of 55 db.

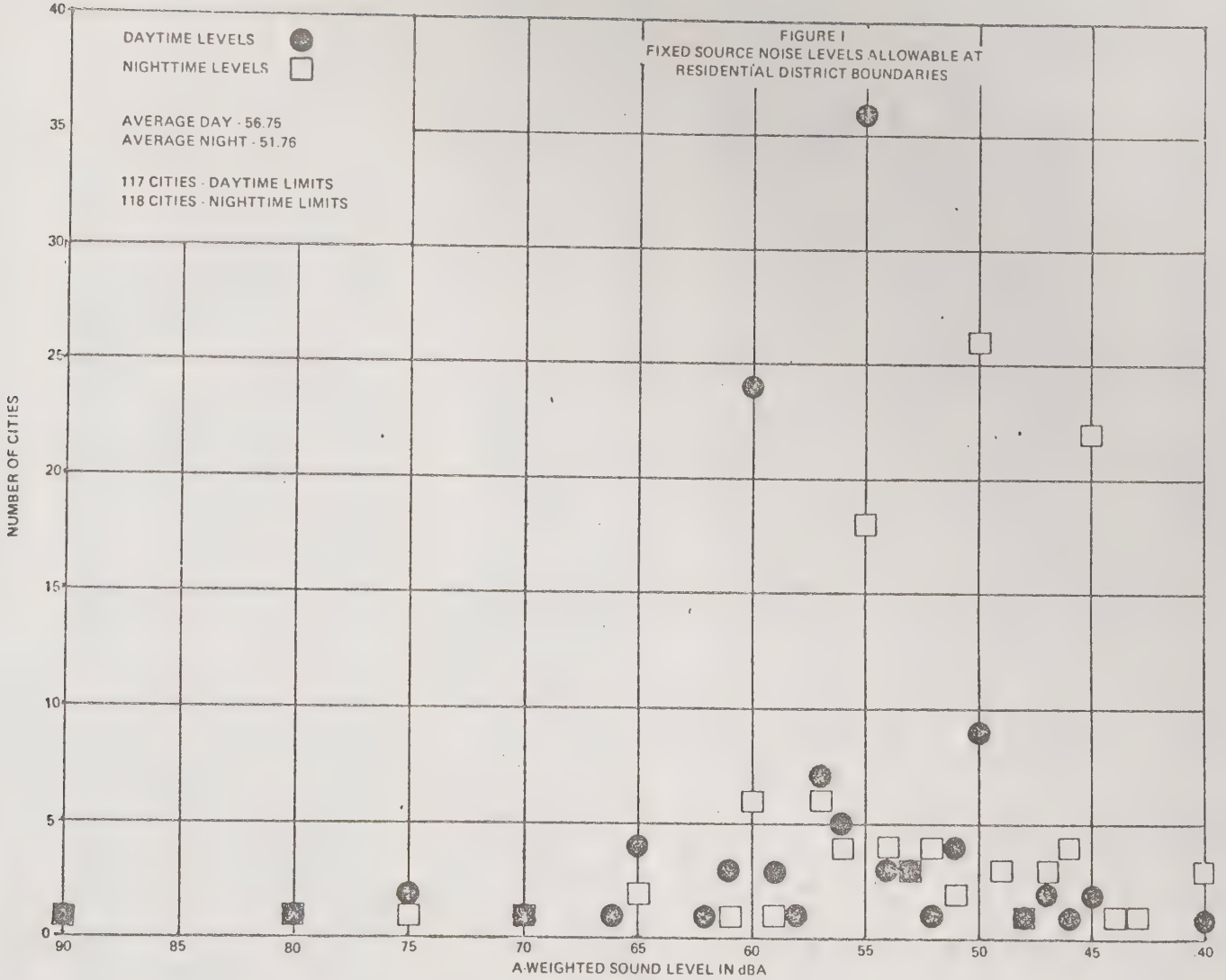
The Noise Element of Shasta County Draft General Plan recommends a maximum Ldn noise level for commercial uses of 60 db. This is equivalent to a daytime Leq of 60 db and a nighttime Leq of 50 db. For industrial uses, the County's draft plan recommends a maximum Ldn of 65 db. This is equivalent to a daytime Leq of 65 db and a nighttime leq of 55 db. Based on an analysis of a City-wide survey presented in Appendix D, the measured noise levels for commercial and industrial uses are not much different than the County's proposed noise standard.

Table 4 on page 15 provides a comparison of the noise levels discussed above and recommends noise standards for industrial and commercial uses. Where the zoning-district boundaries for these uses adjoin residential zoning districts then the noise-level standards for residential zoning districts should prevail. The recommended noise-level standards are referenced to property lines and at a point 100 feet from the edge of pavement. The standards were reviewed by the Office of Noise Control, State Department of Health, and are in keeping with State and Federal standards, and reflect the existing noise environment of the City.

## C. RECOMMENDED LAND USE NOISE STANDARDS AND THEIR CRITERIA

### 1. Recommended Noise Standards

The foregoing discussion establishes the basis for the recommended land-use standards which are summarized in Table 5. Before the standards can be applied to any specific land-use pattern, they should be further defined so that their application is clear, equitable and easily administered. This should be provided as part of the section of the Noise Element dealing with goals, objectives and standards.




EPA Survey

Figure 1 Fixed Source Noise Levels Allowable at Residential District Boundaries

## TABLE 2 EFFECTS OF NOISE ON PEOPLE
### (Residential Land Uses Only)

| Effects[1] / Day-Night Average Sound Level in Decibels | Hearing Loss | Speech Interference | | Annoyance[2] | Average Community Reaction[4] | General Community Attitude Towards Area |
|---|---|---|---|---|---|---|
| | | Indoor | Outdoor | | | |
| | Qualitative Description | % Sentence Intelligibility | Distance in Meters for 95% Sentence Intelligibility | % of Population Highly Annoyed[3] | | |
| 75 and above | May Begin to Occur | 98% | 0.5 | 37% | Very Severe | Noise is likely to be the most important of all adverse aspects of the community environment. |
| 70 | Will Not Likely Occur | 99% | 0.9 | 25% | Severe | Noise is one of the most important adverse aspects of the community environment. |
| 65 | Will Not Occur | 100% | 1.5 | 15% | Significant | Noise is one of the important adverse aspects of the community environment. |
| 60 | Will Not Occur | 100% | 2.0 | 9% | Moderate to Slight | Noise may be considered an adverse aspect of the community environment. |
| 55 and below | Will Not Occur | 100% | 3.5 | 4% | | Noise considered no more important than various other environmental factors. |

1. "Speech Interference" data are drawn from the following tables in EPA's "Levels Document": Table 3, Fig. D-1, Fig. D-2, Fig. D-3. All other data from National Academy of Science 1977 report "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise."
2. Depends on attitudes and other factors.
3. The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time.
4. Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

**NOTE:** Research implicates noise as a factor producing stress-related health effects such as heart disease, high-blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however, have not as yet been quantified.

Source: Guidelines For Considering Noise In Land Use Planning and Control, June 1980, Federal Interagency Committee on Urban Noise

TABLE 3
COMPARISON OF COUNTY, STATE AND NATIONAL RESIDENTIAL NOISE STANDARDS
TO RECOMMENDED RESIDENTIAL NOISE STANDARDS

| STANDARDS (See Note Below) | SINGLE FAMILY DAY Leq (7am - 10 pm) | SINGLE FAMILY NIGHT Leq (10pm - 7 am) | MULTIPLE FAMILY DAY Leq (7am - 10 pm) | MULTIPLE FAMILY NIGHT Leq (10pm - 7 am) |
|---|---|---|---|---|
| I. STATE STANDARDS | | | | |
| A. Title 25, California Ad. Code stipulates that the noise level equaling or exceeding 60 CNEL requires a noise analysis (60 CNEL= 60 Leq + 50 Leq). | 60 | 50 | 60 | 50 |
| B. Title 21, Calif. Ad. Code stipulates maximum allowable noise level for dwellings near airports is 65 CNEL (65 CNEL = 65 Leq + 55 Leq). | 65 | 55 | 65 | 55 |
| C. State Department of Health, Office of Noise Control, recommends maximum of 65 Ldn before unusual building construction requirements are necessary (65 Ldn = 60 Leq + 50 Leq). | 60 | 50 | 60 | 50 |
| II. FEDERAL STANDARDS | | | | |
| A. Housing and urban development standards. Federally-assisted projects can not produce noise levels exceeding 65 CNEL without special approval which which includes attenuation (65 CNEL = 65 Leq + 55 Leq). | 65 | 55 | 65 | 55 |
| B. Environmental Protection Agency Survey of 177 Cities disclosed that most Cities have adopted a maximum nighttime noise level of 50 dbA and a maximum daytime noise level of 55 db (A) (55 Leq + 50 Leq = 57.6 CNEL). | 55 | 50 | 55 | 50 |
| C. Federal Interagency Committee on Urban Noise stated that permanent hearing damage is likely to occur with long-term exposure to a noise level of 75 Ldn (75 Ldn = 75 Leq + 65 Leq). | 75 | 65 | 75 | 65 |
| III. SHASTA COUNTY NOISE STANDARDS | | | | |
| A. Noise element of the County's draft General Plan recommends a maximum level that is normally acceptable is 60 Ldn ( 60 Ldn = 60 Leq + 50 Leq). | 60 | 50 | 60 | 50 |
| IV. CITY OF REDDING STANDARDS | | | | |
| A. Existing mean noise levels for Redding based on 1982 Noise Survey. | 60 | 53 | 60 | 53 |
| *B. Ambient noise level standards of existing adopted Noise Element | 50 | 45 | 55 | 50 |
| C. Recommended residential noise standards are: (60 Leq + 50 Leq = 60 CNEL) | 60 | 50 | 60 | 50 |

NOTE: Noise metric conversions of CNEL and Ldn to Leq day and Leq night are based on reasonable assumed community Leq noise levels that when added using the conversion formula on page __ equals an equivalent CNEL or Ldn standard. It is also assumed that the monitoring periods for Leq are a minimum of one hour.

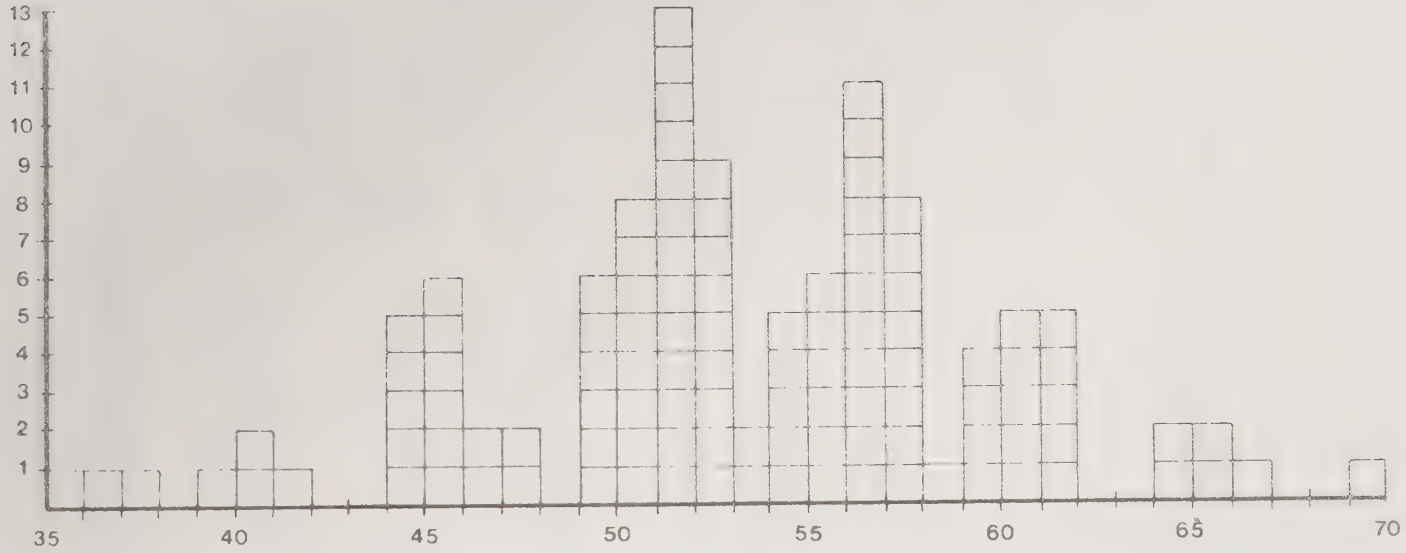
* The adopted City of Redding Noise Element utilizes a ambient noise level standard and therefore not directly comparable to the Leq standard. It is not possible to convert this standard to any noise metric that is used by State or Federal agencies.

TABLE 4
COMPARISON OF COUNTY, STATE AND NATIONAL COMMERCIAL - INDUSTRIAL NOISE STANDARDS
TO RECOMMENDED NOISE STANDARDS

| STANDARDS | COMMERCIAL | | INDUSTRIAL | |
|---|---|---|---|---|
| | DAY Leq (7am - 10 pm) | NIGHT Leq (10pm - 7 am) | DAY Leq (7am - 10 pm) | NIGHT Leq (10pm - 7 am) |
| I. STATE STANDARDS | | | | |
| A. Title 25 California Adm. Code for Hotels and Motels is 60 CNEL (60 CNEL = 60 Leq + 50 Leq). | 60 | 50 | - | - |
| II. FEDERAL STANDARDS | | | | |
| A. Environmental Protection Agency Survey of over 100 cities disclosed that most cities have adopted a maximum day and nighttime levels as indicated (70 Leq + 70 Leq = 76.4 CNEL) (60 Leq + 55 Leq = 62.6 CNEL). | 60 | 55 | 70 | 70 |
| B. Federal Interagency Committee on Urban Noise stated that permanent hearing damage is likely to occur with long term exposure to a noise level of 75 Ldn (75 Ldn = 75 CNEL = 75 Leq + 65 Leq). | Not a recommended standard. 75 | 65 | 75 | 65 |
| III. COUNTY STANDARDS | | | | |
| A. Shasta County Noise Standards. Noise Element of draft General Plan recommends maximum level that is normally acceptable is 60 Ldn for commercial uses and 65 Ldn for industrial uses (60 Ldn = 60 Leq + 50 Leq) (65 Ldn = 65 Leq + 50 Leq). | 60 | 50 | 65 | 55 |
| IV. CITY OF REDDING STANDARDS | | | | |
| A. Existing mean noise standard based on 1982 noise survey (65 Leq + 50 Leq = 64 CNEL) (65 Leq + 50 Leq = 65 CNEL). | 65 | 50 | 65 | 55 |
| B. Existing adopted noise element of General Plan. | 60 | 55 | 75 | 75 |
| C. Recommended noise standards provided that the zoning district boundary for a less noise intense zoning district is not exceeded or noise standards for noise sensitive uses within commercial district are exceeded (65 Leq + 55 Leq = 65 CNEL for commercial). (70 Leq + 60 Leq = 70 CNEL for Industrial). | 65 | 55 | 70 | 60 |

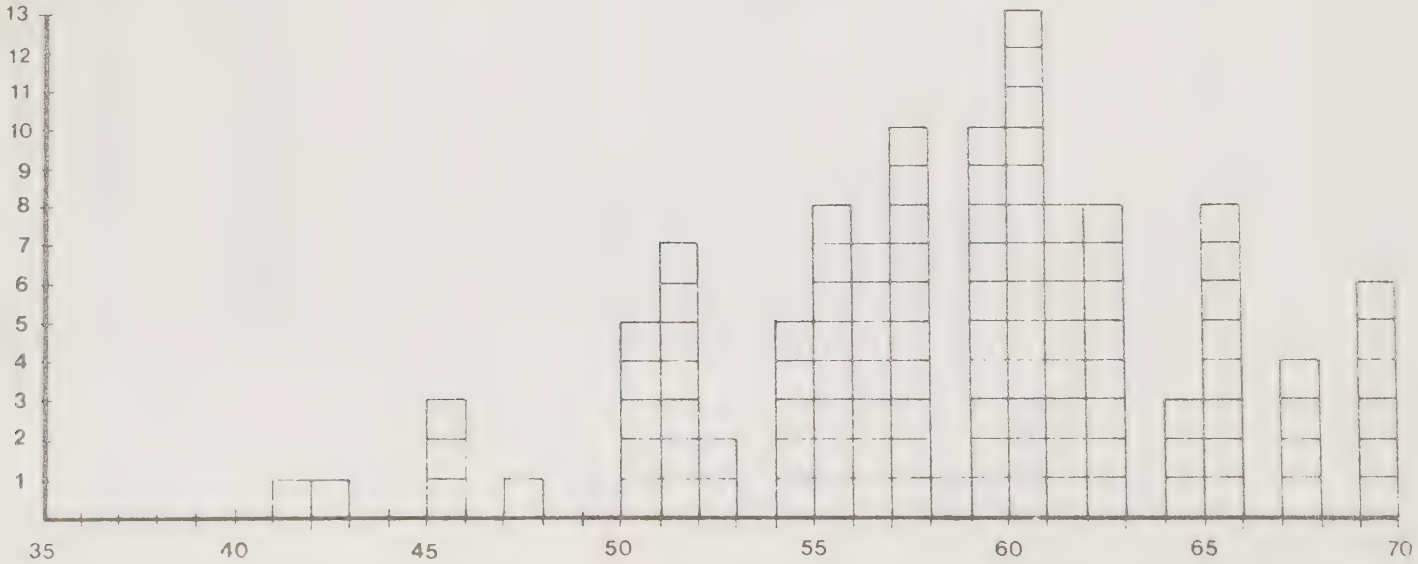
NOTE: Noise metric conversions of CNEL and Ldn to Leq day and Leq night are based on reasonable assumed community Leq noise levels that when added using the conversion formula on page __ equals an equivalent CNEL or Ldn standard. It is also assumed that the monitoring periods for Leq are a minimum of one hour.

* The existing adopted City of Redding Noise Element utilizes a ambient noise level-standard and therefore not directly comparable to the Leq standard. It is not possible to convert this standard to any standard that is acceptable to State or Federal Agencies.



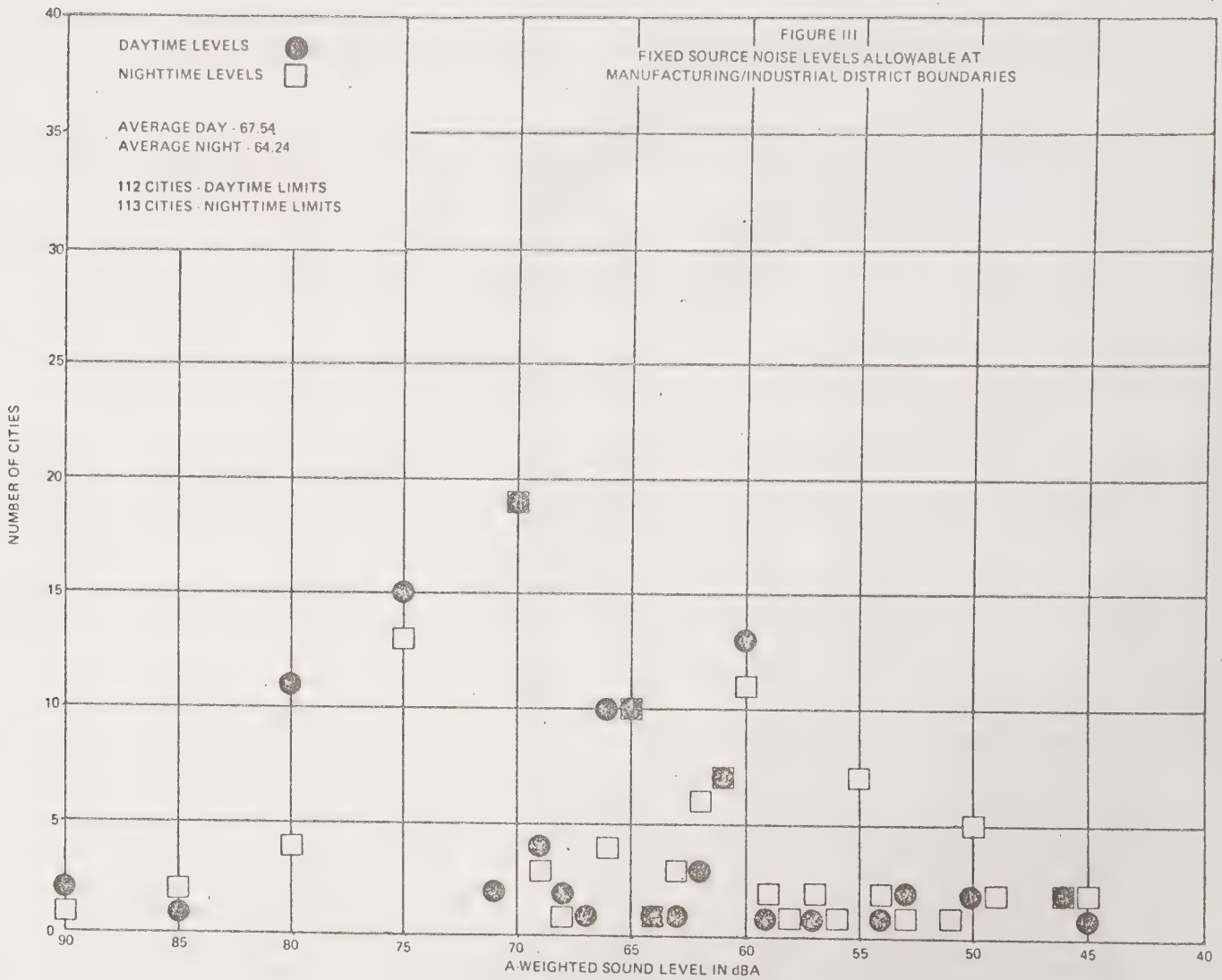

REDDING SURVEY OF NIGHT-TIME NOISE LEVELS
ALONG MAJOR STREETS (1982) SEE APPENDIX E
(MEAN L.E.Q. = 53dba AT 100 FEET FROM EDGE OF PAVEMENT)

FIG. 2




REDDING SURVEY OF DAYTIME NOISE LEVELS
ALONG MAJOR STREETS (1982) SEE APPENDIX E
(MEAN L.E.Q. = 60dba AT 100 FEET FROM EDGE OF PAVEMENT)

FIG. 3




EPA Survey of

Figure 4 Fixed Source Noise Levels Allowable at Manufacturing/Industrial District Boundaries

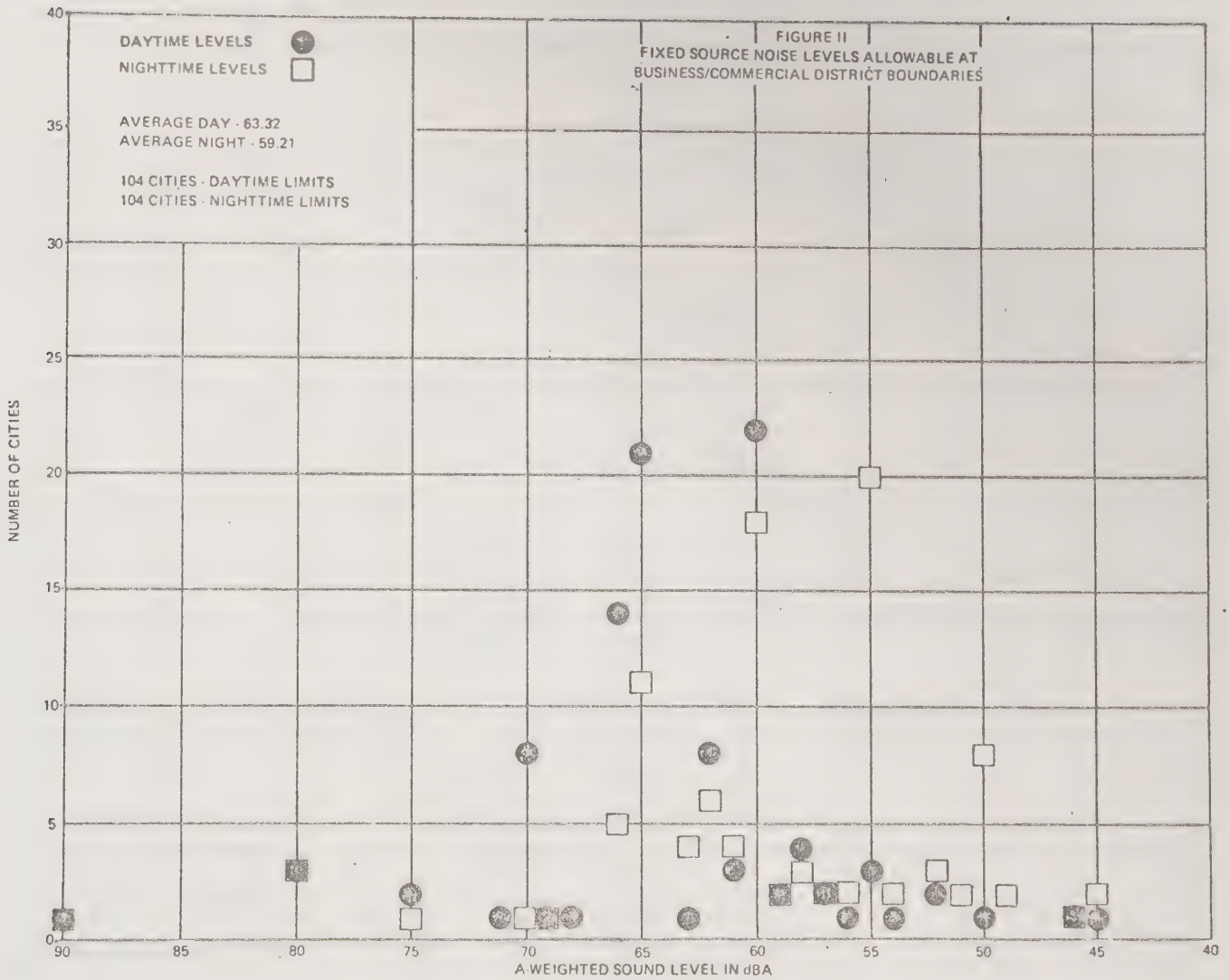



Figure 5 Fixed Source Noise Levels Allowable at Business/Commercial District Boundaries

TABLE 5

RECOMMENDED LAND-USE NOISE STANDARDS

| Land-Use Category | CNEL | Day Leq (7am -10pm) | Night Leq (10pm-7am) |
|---|---|---|---|
| Single Family Zoning District | 60 | 60 | 50 |
| Multiple Family Zoning District | 60 | 60 | 50 |
| All Commercial Zoning Districts | 65 | 65 | 55 |
| All Industrial Zoning Districts | 70 | 70 | 60 |

The reader will note that the noise standard for single-family and multiple-family are identical. It should not be construed that people living in multiple-family structures are willing to accept more noise than those who live in single-family structures. The problem is that they lack a choice of noise environments.

## V. EXISTING AND PROJECTED NOISE ENVIRONMENT

### A. RESIDENTIAL STREETS, HIGHWAYS, FREEWAY, AND MAJOR FOUR-LANE STREETS

In August, 1982, the City completed a noise survey in preparation for the development of noise contours along all highways, including Interstate 5 and four-lane streets. The noise data is presented in Tables 13-22 on pages 92 to 101. The noise metric used is the Leq from which the CNEL was calculated with the aid of the conversion formula below:

$$\text{CNEL} = \frac{15\ (\text{Antiloq Leqday})}{24} + \frac{9\ \text{Antiloq}\ \frac{\text{Leq night} + 10}{.10}}{24}\ \text{loq } 10$$

Noise data for all State highways was cross checked for consistency with noise monitoring data prepared by Caltrans. Noise data for future undeveloped four-lane streets was estimated with aid of nomographs and projected traffic volumes. The tabulated results of all the data in the form of existing and projected noise contours is provided in Appendix D on page 76 in the following order:

NOISE DATA TABLES



As might be expected, the data indicates that I-5 and all highways through Redding including Market Street (Route 273) are the major sources of traffic noise. Of these, I-5 is the biggest source because of the heavy truck traffic. According to the Environmental Protection Agency (EPA), large and medium trucks contribute more to traffic noise than any other type of vehicle (76-81 db); next are motorcycles (76-81 db); then buses (73-71 db); and finally, automobiles and light trucks (64-71 db). This relationship seems to be especially true for highways and major streets in Redding.

#### 1. Projected Noise Impact on Existing Quiet Residential Streets

The noise contours indicate that some quiet residential areas today will be much noisier if the projected traffic volumes become a reality. It should be noted that very little increase in truck volume was anticipated so the projections from this standpoint are conservative. Although the noise level increase relative to the recommended noise standard for residential areas (60 CNEL) may not be excessive, the fact that the increase may be so dramatic could generate noise complaints. The following table list three street-link intervals that could be most affected.

TABLE 23
PROJECTED NOISE IMPACT ON QUIET RESIDENTIAL AREAS (1980 - 2000)

| Street Link | Noise Increase at 100 Feet From Pavement in CNEL | Noise Level Relative to Recommended Residential Noise Standard of 60 CNEL | Relative Loudness to Existing Noise Levels |
|---|---|---|---|
| Cedars Road (Howard Drive to Bonnyview Drive) | 11 db(A) | plus 1 db(A) | 1 times louder |
| Bechelli Lane (Echo Road to Loma Vista Drive) | 6 db(A) | plus 1 db(A) | 1/4 times louder |
| Oasis Road (I-5 to Oasis Road) | 7 db(A) | plus 5.4 db(A) | 1/2 times louder |

2. Projected Noise Impact on Residential Corridors Along Highways and Major Streets

Another way of analyzing the noise contours is the requirement for a noise analysis to determine if noise mitigations are necessary as stipulated by Title 25 of the California Administrative Code. Table 24 list those street links along residential corridors which should require a noise analysis and possible noise mitigations. Recommended standards for noise-mitigation standards for barriers and dwelling-unit designs are provided on pages 10 to 16 and 76 to 83, respectively.

3. Existing Vehicle Noise Abatement Programs

Vehicle noise abatement programs are programs aimed at reducing the noise level at the source. According to Redding Police Department Officials, the police no longer vigorously enforce vehicle noise laws because of a recent case law which stipulated that it is illegal to use a noise meter to site drivers for noise violations under certain conditions. The case-law finding only pertains to vehicles with mud tires (mainly trucks) which cause a noise meter to register a noise violation; however, the Police Department has taken a safe conservative legal position by not using the meter under any circumstances.

The current noise-abatement procedure used by officers is strictly subjective. For example, if it is obvious to an officer that excessive noise is being caused by a modified engine or a broken muffler, the officer will issue a citation to the driver. The California Highway Patrol policy on noise abatement is very similar in that officers use the subjective tactic of if you can hear the exhaust over the engine then there is probably a noise violation of the vehicle code.

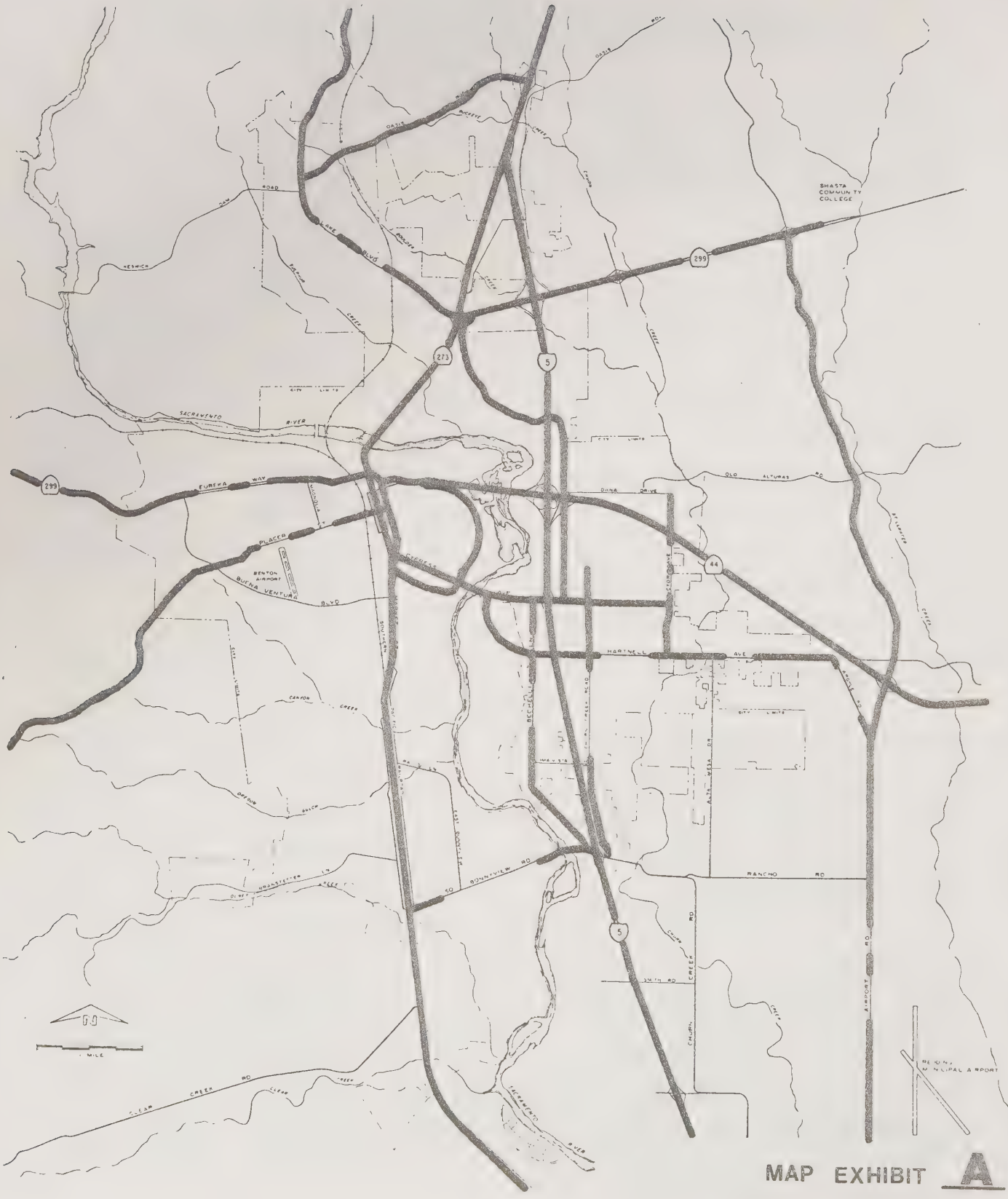
TABLE 24
CORRIDORS ALONG STREETS AND HIGHWAYS WHICH SHOULD
REQUIRE A NOISE ANALYSIS FOR NEW RESIDENTIAL PROJECTS
TO DETERMINE IF MITIGATIONS ARE NEEDED.
(1980-2000)
(SEE MAP EXHIBIT "A" ON PAGE 24)

| Street Link | Affected corridor width from edge of pavement where the noise level exceeds 60 CNEL by more than one decibel. |
|---|---|
| Victor Avenue (Highway 44 to Old Alturas Road) | 150 feet |
| Airport Road (Argyle Road to Meadow View Drive) | 250 feet |
| Old Oregon Trail (Highway 44 to Highway 299 East) | 150 feet |
| Lake Boulevard | |
| *(Route 273 to Clay Street) | 580 feet |
| *(Clay Street to Tamarack Drive) | 500 feet |
| *(Tamarack Drive to Oasis Road) | 300 feet |
| *(Oasis Road to Ashby Road) | 150 feet |
| Hartnell Avenue | |
| Bechelli Lane to Cypress Avenue | 600 feet |
| *(Churn Creek Road to Victor Avenue) | 400 feet |
| *(Victor Avenue to Argyle Road) | 270 feet |
| Argyle Road to Airport Road | 100 feet |
| Bechelli Lane | |
| Cypress Avenue to Hartnell Avenue | 300 feet |
| Hartnell Avenue to Dana Vista Drive | 270 feet |
| Loma Vista Dr. to So. Bonnyview Rd. | 150 feet |
| Churn Creek Road | |
| *(Highway 44 to Cypress Avenue) | 600 feet |
| *(Cypress Avenue to Loma Vista Drive) | 600 feet |
| Loma Vista Drive to Rancho Road | 200 feet |

* Already exceeds the 60 CNEL by one decibel for 1982 at 100 feet from the pavement edge.

| Street Link | Affected corridor width from edge of pavement where the noise level exceeds 60 CNEL by more than one decibel. |
|---|---|
| Placer Street | |
| *(Court Street to Almond Street) | 270 feet |
| Almond to Buenaventura Boulevard | 270 feet |
| Buenaventura Blvd to City Limits | 200 feet |
| Hilltop Drive | |
| Lake Boulevard E. to I-5 | 300 feet |
| I-5 to Cypress Avenue | 580 feet |
| Parkview Avenue (Market Street to Park Marina Drive) | 150 feet |
| Park Marina Drive (Highway 299 E. to Cypress Avenue) | 150 feet |
| Cedars Road (Howard Drive to South Bonnyview Road) | 120 feet |
| Cypress Avenue | |
| *(Market Street to Sacramento River) | 580 feet |
| *(Sacramento River to Victor Drive) | 300 feet |
| Rancho Road (Churn Creek Road to Alta Mesa Drive) | 270 feet |
| Alta Mesa to Airport Road | 210 feet |
| State Route 299 E. and Eureka Way | |
| *(Old Shasta to Redding City Limits) | 600 feet |
| *(Buenaventura Blvd. to Orange Avenue) | 500 feet |
| *(I-5 to Hawley Road) | 900 feet |
| *(Hawley Road to Old Oregon Trail) | 410 feet |
| State Route 44 | |
| *(Victor Avenue to Old Oregon Trail) | 370 feet |
| *(Canby Road to Victor Avenue) | 370 feet |
| State Route 273 (Market Street) | |
| *(Eureka Way to Anderson City Limits) | 1,100 feet |
| *(Eureka Way to Benton Drive) | 900 feet |
| *(Benton Drive to I-5 Connection) | 900 feet |
| Interstate 5 (through Redding) | 2,000 feet |

* Already exceeds the 60 CNEL by one decibel for 1982 at 100 feet from the pavement edge.




CORRIDORS ALONG MAJOR STREETS AND HIGHWAYS WHICH MAY REQUIRE NOISE ANALYSIS AND MITIGATION FOR RESIDENTIAL PROJECTS.

Both of these approaches are probably adequate for abating the worst case situations, but they do not address the borderline problems of excessive vehicle noise which can only be accomplished with a noise meter.

4. Public Concerns

a. The traffic volumes on many major four-lane streets in Redding will double in the next 20 years. This, in turn, will cause noise levels for residential areas abutting these streets to exceed the recommended standard of 60 CNEL.

b. The current Police Department vehicle-noise-abatement program of not using a noise meter for noise violations should be evaluated in terms of its effectiveness and public liability.

## B. PASSENGER AND FREIGHT ON-LINE RAILROAD OPERATIONS

### 1. Existing Land Projected Noise Levels

The Southern Pacific main line bisects the City in a north-south direction. The noise generated by train traffic is of a longer duration than that generated by aircraft and combines both engine and track noise. Occasional switching movements create intrusive peak noises. A typical freight train at 50 feet from the track produces a daytime CNEL of 86 db for three minutes while the engine produces a peak of 100 db tor five seconds.

The development of noise contours for train traffic requires the evaluation of many variables along the tracks route. These are noted in Table 25.

In general, the existing rail noise contours through Redding are a function of the number of day- and night-time train trips and whether or not the train traffic is freight or passenger. Incorporating these factors in the train-noise model developed by the State Office of Noise Control produces the following noise contour intervals.

Table 25
NOISE CONTOURS IN CNEL FOR TRAIN TRAFFIC THROUGH REDDING

| Noise level | 70 | 65 | 60 | 55 |
|---|---|---|---|---|
| Distance From Track | 180' | 330' | 620' | 1,300' |

Since Southern Pacific Officials do not project any increase in train operations over the next ten years, these generalized contour intervals represent both existing and projected levels. They are based on an average of 17 train trips per day, 7 nights and 10 days. Specific noise contours for each location along the track may be estimated by applying the adjustment factor shown in Table 26.

TABLE 26
ADJUSTMENTS TO CNEL NOISE CONTOURS
(Source: State Department of Health)

| Variables Affecting Noise Output | Correction to Desired CNEL Value, db |
|---|---|
| a. Passenger trains only (If combination of passenger and freight -- assume all freight.) | -1 |
| b. Presence of helper engines: | |
| 1. Level grade or descending grade | 0 |
| 2. Ascending grade | +2 |
| c. Mainline welded or jointed track | 0 |
| d. Low speed classified jointed track | +4 |
| e. Presence of switching frogs or grade crossings | +4 |
| f. Tight radius curve | |
| 1. Radius less than 600 feet | +4 |
| 2. Radius 600 to 900 feet | +0.5 |
| 3. Radius greater than 900 feet | 0 |
| g. Presence of bridge work | |
| 1. Light steel trestle | +14 |
| 2. Heavy steel trestle | +5 |
| 3. Concrete structure | 0 |

2. Existing Noise Mitigation Programs

Whenever a developer proposes a residential project near the Southern Pacific Railroad tracks, the project is reviewed to determine if building noise standards are needed to achieve an interior noise level of 45 db in living areas and 35 db in the sleeping areas of the units. This requirement is reinforced by the State under Title 25 of the California Administrative Code, which stipulates that residential projects within an annual CNEL noise contour of 60 db require an acoustical analysis showing that the structure can be designed to limit intruding noise levels.

In some cases, the City may impose development conditions to reduce the interior noise levels similar to those listed on page 37.

3. Public Concerns

a. Noise contours for specific projects are not always field checked with a noise monitor at the time actual railroad operations are occurring.

b. Noise-mitigation standards for railroad operations have not been adopted by the City.

## C. COMMERCIAL, GENERAL AVIATION, HELISTOPS AND AIRCRAFT OVERFLIGHTS

Since the Redding area includes four airports, two publicly owned and two privately owned, aircraft noise is a significant issue. Noise complaints are only occasional; but as urban densities increase, aircraft noise could become a major nuisance for some residential areas near the airports.

Noise Standards for California airports are set forth in Title 21, Sections 5000 of the California Administrative Code. This title establishes the level of noise acceptable to a person residing in the vicinity of any airport as community noise equivalent level (CNEL) value of 65 db. Section 5005(c) states that "This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep, and community reaction."

Other noise insulation standards set forth in California Administrative Code, Title 25, Section 28 are applicable to new hotels, motels, apartment houses and dwellings other than detached single-family dwellings. These standards require interior CNEL with windows closed to be 45 db or less in any habitable room. They also require new residential structures (excluding single-family detached units) within the 60 CNEL contour to have an acoustical analysis showing that the structure has been designed to limit intruding noise to the prescribed level.

Federal Guidelines for Considering Noise in Land Use Planning and Control discourage residential use within the 65 CNEL contour, stating that "The absence of viable alternative development options should be determined and an evaluation indicating that a demonstrated community need for residential use would not be met if development were prohibited in these zones should be conducted prior to approvals."

All of these government standards are important considerations in the evaluation of airport noise contours. Noise contours were developed for Redding's two publicly owned general aviation airports. The other two privately owned airports are classified as utility and do not represent a significant noise problem. The significance of the noise contours can be better understood by referring to Table 27 on page 28.

### 1. Redding Municipal Airport

The Redding Municipal Airport is a general aviation and commercial airport located southeast of Redding's City limits off Airport Road. Of the three airports, Redding Municipal Airport is the most critical in terms of community investment and service. Currently, the Airport does not pose a significant neighborhood noise problem for nearby residents, but airport expansion coupled with surrounding urbanization could cause discontent for existing and future residential neighborhoods.

The City has adopted an Airport Area Plan for the 11-square-mile area around the Airport. The 20-year plan includes airport noise projections and discusses the noise impacts of the Airport. The plan also sets forth goals, objectives, and standards relating to noise impacts.

According to the Area Plan, within the 65 CNEL contour for 1981 of Map Exhibit B on page 31, there currently are 2 churches; the Anderson Grange; 59 single-family homes on foundations; and 15 mobile homes. Although the area of impact will be less in the year 2000 than it is in 1981, significant changes are not expected until near the end of that period when virtually all of the older, noisier aircraft have been retired. (See Map Exhibit C on page 32.)

Airport owners elsewhere have found the argument "the airport was there first," to have little meaning to vociferous residents who built or purchased homes in aircraft noise patterns. The U. S. Supreme Court has recognized severe airport noise as a legitimate reason for award of damages. In some instances where noise levels are in violation of Federal levels, a 24-hour noise monitoring station may be required to alert the owner and the Federal government to noise conditions so the air traffic can be lessened to reduce the noise level. The only real way to protect the public investment in a major airport is to keep the problems from arising by preventing incompatible development.

TABLE 27

CHART FOR ESTIMATING COMPLAINT RESPONSE
OF RESIDENTIAL NEIGHBORHOODS TO AIRCRAFT NOISE

| CNEL Noise Contour Rating for Takeoffs and Landings | Description of Expected Responses |
|---|---|
| Less than 65 CNEL | Essentially no complaints would be expected. The noise may, however, interfere occasionally with certain activities of residents. |
| 65 to 75 CNEL | Individuals may complain, perhaps vigorously. Concerted group action is possible. Locations of places of public assembly in this, as well as Zone 1, should be carefully studied and, if required, provisions made to cope with expected noise levels. |
| Greater than 75 CNEL | Hearing loss may occur, individual reations would likely include repeated, vigorous complaints. Concerted group action might be expected. |

Source: Bolt, Beranek & Newman, Inc., Land Use Planning Relating to Aircraft Noise October, 1965. CNEL noise zones estimated based on CNR equivalents.

FAA grants may be used to acquire land within the current or projected 65 CNEL contour. Redding is not be high enough on the priority list to qualify, given current funding levels; however, the FAA would agree to the sale of 110 acres of surplus airport property west of Airport Road if the revenue were used for grant-eligible airport improvements within five years. Assuming sale at $25,000 per acre, $2.75 million could be raised. Land purchased with these funds could be leased to compatible uses, but approval for sale may be difficult to obtain.

2. Benton Air Park

This airport facility is operated by the City primarily for general aviation. The airport is located west of the downtown area off Placer Road. Topographic conditions prevent it from being expanded. Potential noise problems exist at the north and south ends of the airport runway. At the north end of the runway, the projected 1995, 65 CNEL encircles nine residential lots located on Shasta Street west of Almond Avenue. At the south end of the runway, the same noise contour encircles two residential lots located off Starlight Boulevard. The City recently acquired the two parcels at the south end. (See noise contour map Exhibits D and E on pages 33 and 34.)

Aside from aircraft overflights being source of complaints, the California Highway Patrol helicopter, which is based at the Airport, has also caused several residents to complain.

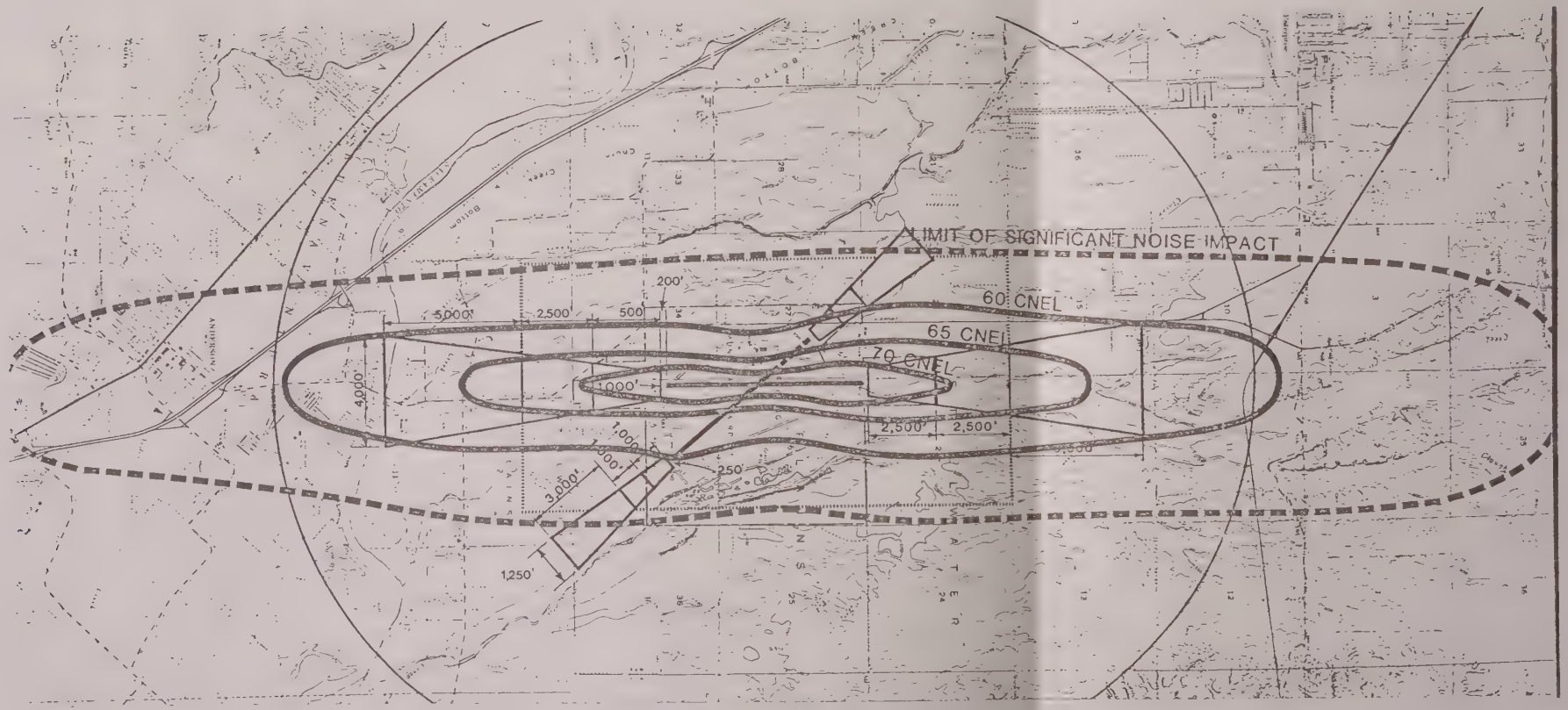
The principal of Shasta High School, which is located .7 of a mile north of the runway, has stated that aircraft noise from overflights interferes with school activities sometimes even with the windows closed. Principals at Nova Junior High and Manzanita schools indicated no noise problems.

3. Enterprise Sky Park

This facility is a basic utility airport located on the north side of Highway 44 west of Old Oregon Trail. The major issue with this airport is its close proximity of residential structures on the south side of Highway 44. Noise contours have not been developed for this airfield because of its limited use. Although the airport operators have a long term lease of the land for Airport purposes, they have no plans for expansion.

4. Sky Ranch Airport

This private field is located south of Clear Creek and west of Rt. 273. The amount of air traffic presently using the field does not present a noise problem to residents located north and south of the runway. Noise contours have not been developed for this field, and it is expected that the facility may soon be phased out in favor of another land use. The Cascade Neighborhood General Plan did not recognize the Airport as a long-term land use.



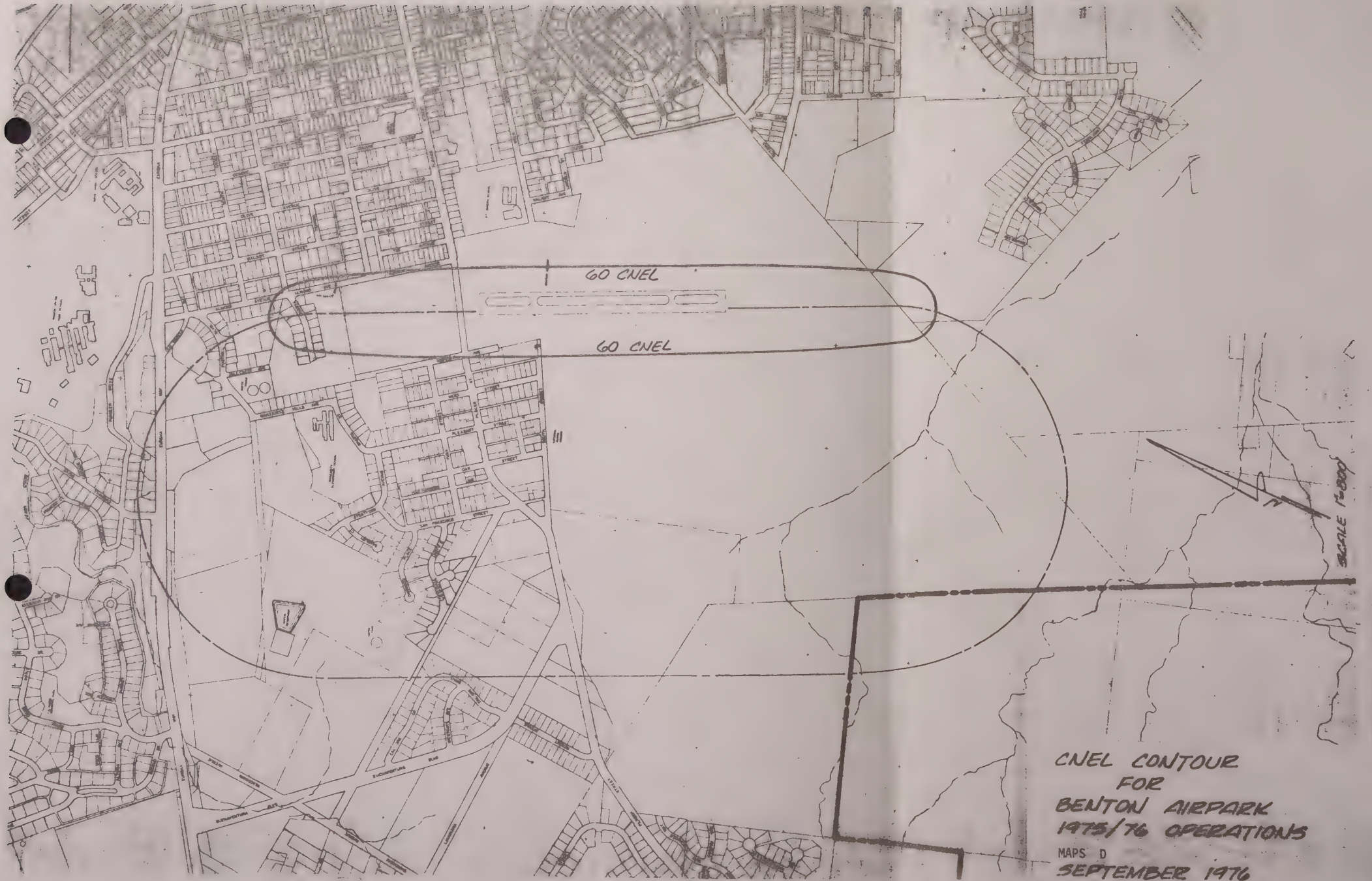

| Aircraft Mix | Total Operations Average Day | Runway Utilization: Takeoff 16 | Takeoff 34 | Takeoff 12 | Takeoff 30 | Landing 16 | Landing 34 | Landing 12 | Landing 30 | Time of Day: Day (0700-1900 hours) | Evening (1900-2200 hours) | Night 2/ (2200-0700 hours) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC-9/737 | 14 | 40% | 60% | — | — | 40% | 60% | — | — | 78% | 15% | 7% |
| Business or Military Jet | 6 | 40% | 60% | — | — | 40% | 60% | — | — | 84% | 16% | — |
| 4-engine propeller 1/ | 4 | 60% | 40% | — | — | 25% | 75% | — | — | 75% | 25% | — |
| 2-engine propeller: heavy 1/ | 2 | 60% | 40% | — | — | 25% | 75% | — | — | 75% | 25% | — |
| 2-engine propeller: light | 30 | 28% | 42% | 30% | — | 32% | 48% | 2% | 18% | 84% | 14% | 2% |
| 1-engine propeller | 218 | 26% | 39% | 34% | 1% | 30% | 45% | 3% | 22% | 86% | 12% | 2% |

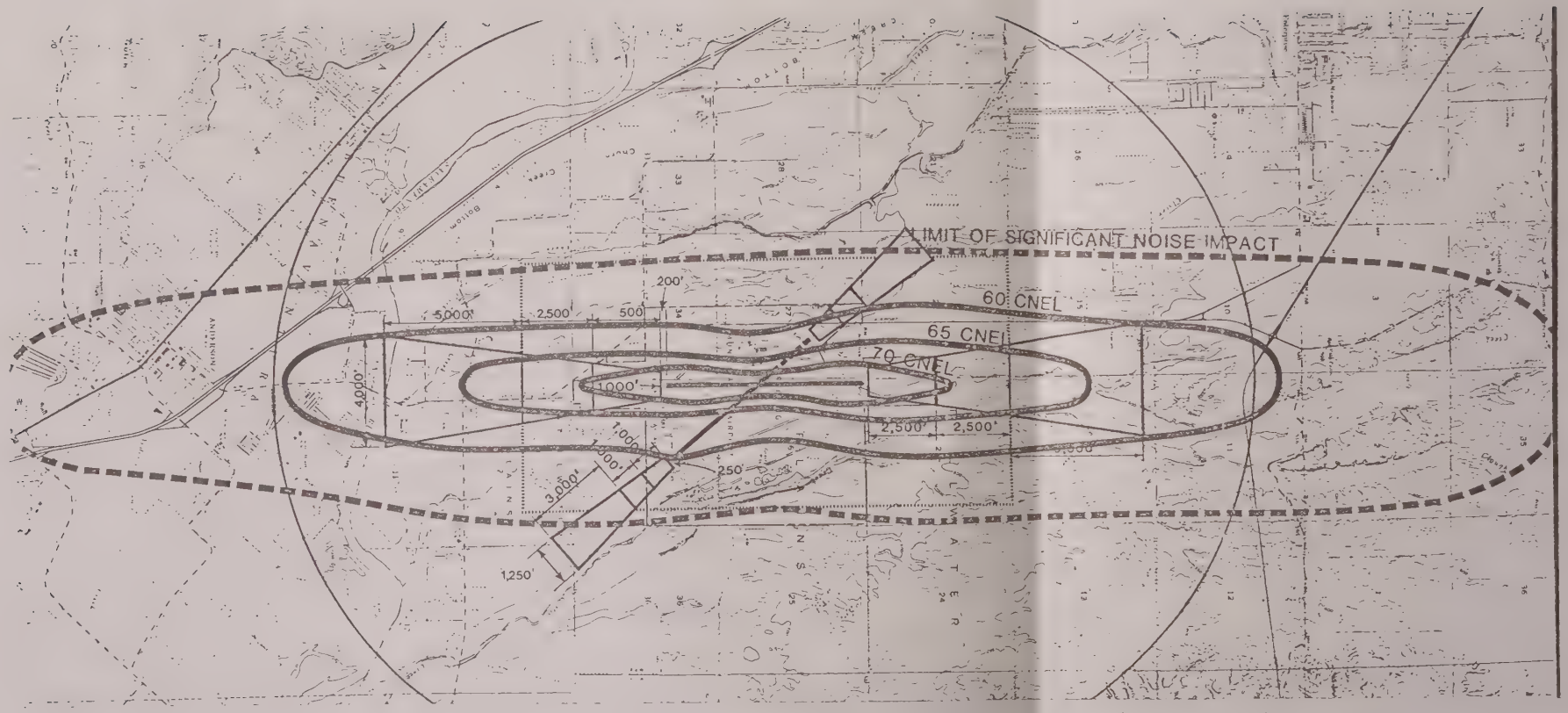
1/ Primarily U.S. Forest Service and California Division of Forestry fire attack aircraft. Total operations figures represent average day of 4-month fire season.

2/ No night operations on Runway 12-30.

NOISE IMPACT AREA - 1981

MAPS B


60 CNEL
60 CNEL
SCALE 1"=800'
CNEL CONTOUR
FOR
BENTON AIRPARK
1975/76 OPERATIONS
MAPS D
SEPTEMBER 1976



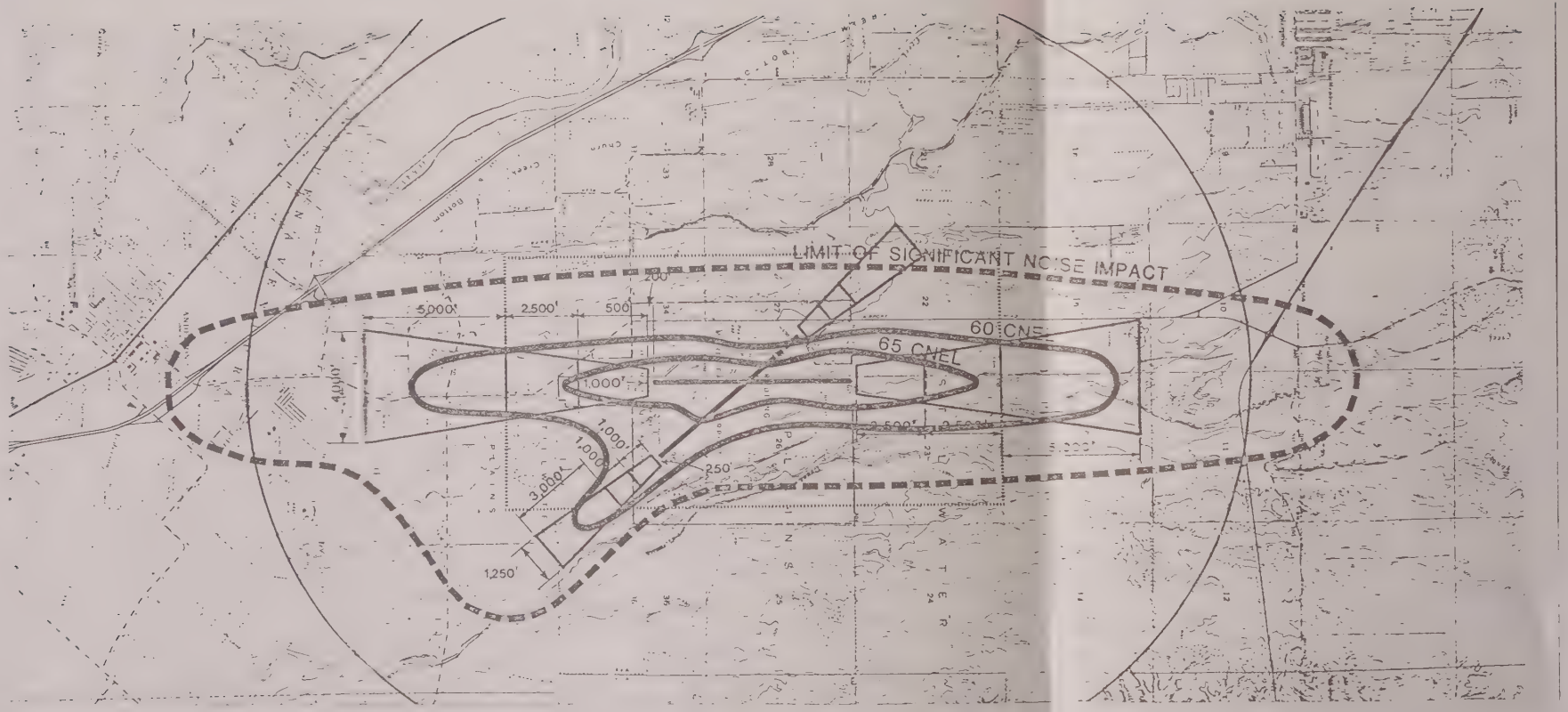

| Aircraft Mix | Total Operations Average Day | Runway Utilization: Takeoff 16 | Takeoff 34 | Takeoff 12 | Takeoff 30 | Landing 16 | Landing 34 | Landing 12 | Landing 30 | Time of Day: Day (0700-1900 hours) | Evening (1900-2200 hours) | Night 2/ (2200-0700 hours) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC-9/737 | 14 | 40% | 60% | — | — | 40% | 60% | — | — | 78% | 15% | 7% |
| Business or Military Jet | 6 | 40% | 60% | — | — | 40% | 60% | — | — | 84% | 16% | — |
| 4-engine propeller | 4 | 60% | 40% | — | — | 25% | 75% | — | — | 75% | 25% | — |
| 2-engine propeller: heavy 1/ | 2 | 60% | 40% | — | — | 25% | 75% | — | — | 75% | 25% | — |
| 2-engine propeller: light | 30 | 28% | 42% | 30% | — | 32% | 48% | 2% | 18% | 84% | 14% | 2% |
| 1-engine propeller | 218 | 26% | 39% | 34% | 1% | 30% | 45% | 3% | 22% | 86% | 12% | 2% |

1/ Primarily U.S. Forest Service and California Division of Forestry fire attack aircraft. Total operations figures represent average day of 4-month fire season.

2/ No night operations on Runway 12-30.

NOISE IMPACT AREA - 1981

MAPS B




| Aircraft Mix | Total Operations Average Day | Runway Utilization Takeoff 16 | Takeoff 34 | Takeoff 12 | Takeoff 30 | Landing 16 | Landing 34 | Landing 12 | Landing 30 | Time of Day Day (0700-1900 hours) | Evening (1900-2200 hours) | Night 2/ (2200-0700 hours) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC-9/737 | 19 | 40% | [illegible] | — | — | 40% | 60% | — | — | 78% | 15% | 7% |
| Business or Military Jet | 30 | [illegible] | [illegible] | 15% | — | 36% | 54% | 1% | 9% | 81% | 17% | 2% |
| 4-engine propeller 1/ | 4 | 48% | [illegible] | 20% | — | 30% | 45% | — | 25% | 75% | 25% | — |
| 2-engine propellers: heavy 1/ | 2 | 45% | [illegible] | 25% | — | 28% | 42% | — | 30% | 75% | 25% | — |
| 2-engine propellers: light | 73 | 28% | [illegible] | 30% | — | 32% | 48% | 2% | 18% | 82% | 15% | 3% |
| 1-engine propeller | 250 | 26% | [illegible] | 34% | 1% | 30% | 45% | 3% | 22% | 84% | 13% | 3% |

1/ Primarily U.S. Forest Service and California Division of Forestry fire attack aircraft. Total operations figures represent average day of 4-month fire season.

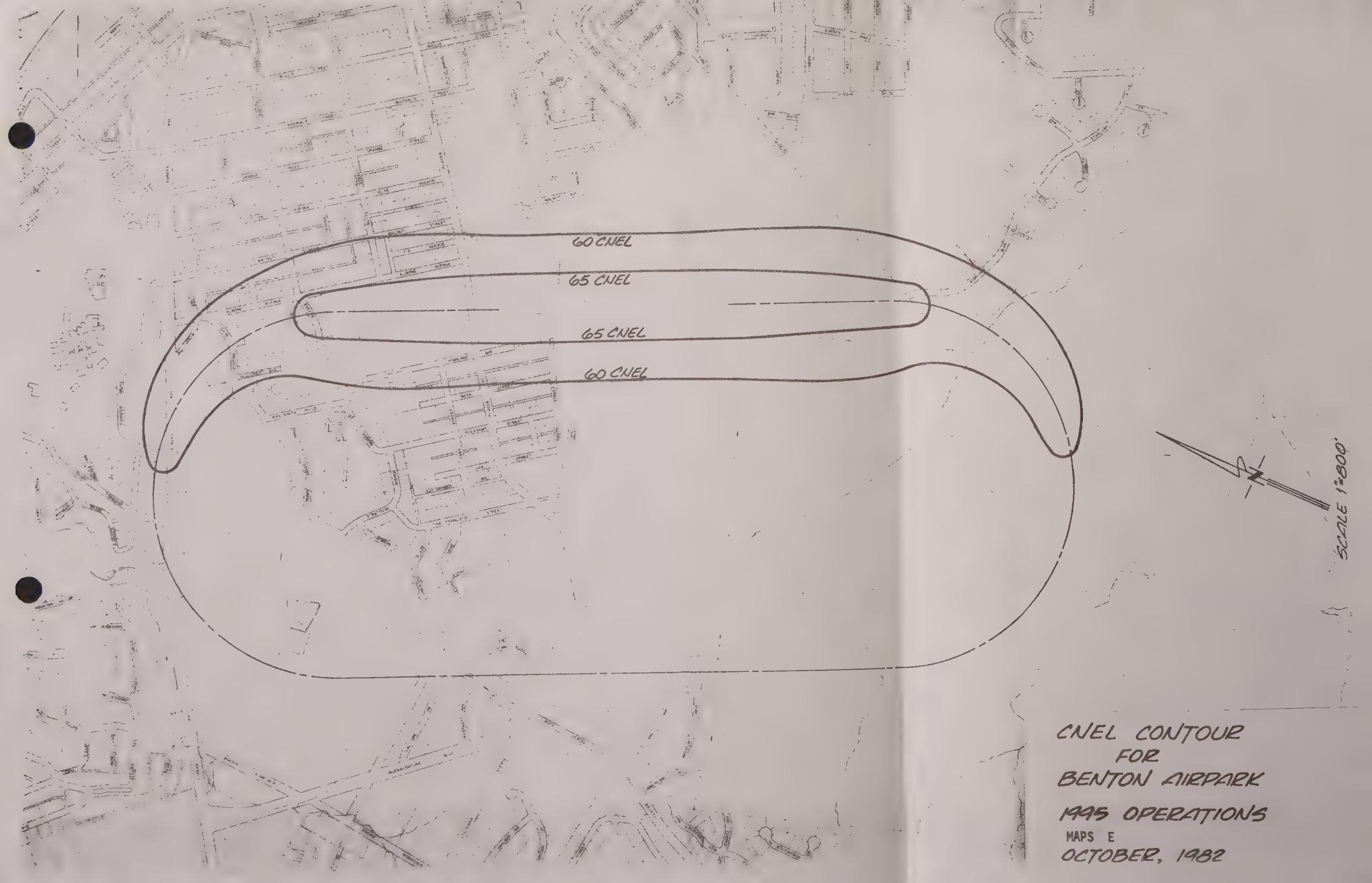
2/ No night operations on Runway 12-30.

NOTE: 70 CNEL contour remains within 200 feet of runway.

NOISE IMPACT AREA - 2000

MAPS C

0 4000'




CNEL CONTOUR
FOR
BENTON AIRPARK
1995 OPERATIONS
MAPS E
OCTOBER, 1982

## D. EXISTING LAND USE NOISE PROBLEMS AND ABATEMENT

Probably the most controversial noises produced in the community are from land-use activities. This includes industrial, commercial and, to a lesser degree, residential noises from lawn mowers; air conditioners; barking dogs; and loud parties.

### 1. Commercial and Industrial Noise Sources

Over the past five years, the Planning Department has compiled a record of noise complaints from nearby residents concerning commercial and industrial land use as noted below:

a. Mountain Lakes Industrial Park along Woggon Lane and along Redwood Boulevard and along the southerly property of the industrial park adjacent to the mobilehome park subdivision.

b. Industrial and manufacturing uses on Canyon Creek Road, Eastside Road and Moore Road.

c. Isolated incidences of refrigeration air compressors from neighborhood grocery stores throughout the City.

d. Sand and Gravel operations on the east bank of the Sacramento River west of Knighton Road.

e. Sand and Gravel operation and sawmill on the east bank of the Sacramento River south of Cypress Avenue.

f. Redding Industrial Park (Larkspur Lane area).

g. Heavy commercial and industrial uses along Twin View Boulevard.

h. Auto wrecking on Hartnell Avenue and on Girvan Road.

i. Gravel-removal operations within the planning area.

j. Scattered drinking and dance-hall establishments.

k. Loud stereos from vehicles cruising the downtown areas and from portable stereos transported by pedestrians to the downtown area.

In several instances, the industrial noise complaints from the sources above were forwarded to the Planning Commission and ultimately the City Council for mediation. In general, the complaints are the result of residential areas developing adjacent to existing industrial areas or visa versa.

Each category of land use has different noise-nuisance characteristics. For example, intrusive industrial noise is generally associated with the banging of pipes with forklifts or peak noise levels produced by mechanical equipment such as a shear press, saws, grinders, or riveters. Of these, the most intrusive to local residents appears to be forklift and shear-press operations.

Complaints concerning intrusive industrial noises focus on nighttime operations between 11 p.m. and 6 a.m. During this period, background noise levels such as traffic and other urban activities are at a minimum; consequently, impulse noises become more obvious. It is difficult for residents to isolate themselves from impulse noise levels, particularly during the warm summer evenings when windows are left open for ventilation. This condition is worsened by the fact that garage doors of industrial buildings are usually left open for ventilation.

Commercial noise complaints from residents are almost solely limited to live entertainment for dance halls and the congregation of patrons in the parking lots of the dance halls. Noise monitoring indicates that the peak noise levels of high frequency can be economically mitigated by conventional construction techniques, but low-frequency, peak noise levels emitted by base instruments are difficult to reduce.

A more recent type urban noise that has become a problem during the evening hours is attributed to cruising the downtown by young people on Friday and Saturday nights. The noise caused by cruising is generally confined to racing of automobile engines and loud intrusive music from automobile stereos. Portable stereos carried by pedestrians have become very popular.

Cruising the downtown area has been in occurrence since the 1950s, but with increased affluence and population, and with advancement in stereo technology for automobile and portable stereos, the noise problem from cruising has caused many residents to demand that cruising be prohibited. According to the police chief, the cruising problem is generally limited to an area bounded by California, Tehama, Pine and Gold Streets. These are essentially the streets that encircle the Downtown Mall.

Cruisers often park in parking lots (public and private) and open the car doors which have speakers mounted in them. The volume is then cranked up, which in turn attracts other cruisers and pedestrians.

Some cities have passed ordinances to control or prohibit cruising, but the ordinances have been held unconstitutional on the basis of restricting freedom of travel. The City does have an ordinance which prohibits excessive noise from sound trucks; however, the ordinance would have to be modified to deal with this modern day problem. Other noises from vehicles such as horns, yelling from vehicles, drag racing and loud exhaust systems can be controlled through the vehicle code.

2. Residential Noise Sources

Complaints about excessive noise within residential areas noise are generally limited to loud parties, loud stereos, barking dogs or a neighbor who repairs cars or boats as a hobby. This type of complaint is almost impossible to enforce by the City because of the lack of an noise-control ordinance and staff to conduct monitoring during nonworking hours.

In 1981-82, the Redding Police Department investigated over 3,500 noise complaints, most of which deal with noise within residential areas. The complaints are generally limited to the hours of 7 p.m. to 1 p.m.

3. Existing Mitigation and Abatement Programs

a. Land-Use Mitigation Programs

Unless the City has imposed a noise standard as a condition of project approval, it is not possible to resolve a noise problem. Typically, the City will stipulate as a condition of project approval that "On-site noise sources are not to increase the ambient noise level on adjoining property by more than 3 db or cause the ambient noise level to exceed the recommended day-night levels of the City's General Plan Noise Element."

The problem with this standard is unless the preexisting on-site ambient noise level is documented, the noise standard is not enforceable. Also the existing ambient noise level may already exceed the recommended ambient standard of the General Plan, in which case the addition of three more decibels may be more than the "Straw that broke the camel's back."

In situations where there is an obvious violation of this standard, then the City has added a condition to require the installation of one or a combination of the following:

- Installation of site screening and/or landscaping.
- Closing of garage doors to confine the noise source.
- Modifying the hours of operation so as not to disturb sleep.
- Additional noise insulation.
- On-site security officers to control the noise level caused by patrons.
- Reduce the noise level to an acceptable level.
- Elimination of certain nuisances such as loud yard horns, buzzers, or intercoms.

When the City is aware of an existing noise problem and a residential project is proposed near the noise source, then as a condition of approval, the developer is required to demonstrate that the dwelling unit can achieve an interior ambient noise of 45 db in living areas and 35 db in sleeping areas. Both of these standards are in the City's 1974 Noise Element. If the residential project does not consist of single-family detached units and it is located near a major transportation system (e.g. airport, railroad or highway) then a noise analysis and noise mitigations are mandated if the exterior noise level exceeds 60 CNEL or an interior CNEL level of 45 db as stipulated in the California Government Code, Title 25.

One of the difficulties with the local requirements of the City and State is that there are no designers who have acceptable noise monitoring equipment or who are trained in this specialized field. Compliance is further compromised by the fact that the City provides no guidelines or standards or how it might be possible to satisfy the standards on mitigate a noise problem.

One major concern with the City's existing noise problems is that there is no way to deal with peak noise levels which are generally the major source of nighttime annoyance. The adopted 1974 Noise Element recommends the adoption of noise zones, noise ordinances and series of other measures to provide guidance, but these tasks have not been accomplished.

The current procedure for dealing with a nighttime noise complaint by the Police Department is as follows:

- The complaint is investigated and if the officer subjectively believes the noise is disturbing he will ask the owner or occupant to quiet the noise source.

- The officer will then reinvestigate a short time later for compliance. If the noise source has not quieted down or if additional complaints are received, he will once again inform the owner or occupant to quiet down or be cited for disturbing the peace.

- If subsequent noise complaints are received then the officer may observe the property (particularly if it is a loud party) to see if other laws are being broken. After a while, the officer may make an arrest for disturbing the peace. If no other laws are being broken and neighborhood reaction is not overwhelmingly significant then the complaint may go unresolved.

- If the complainants are unwilling to sign a complaint then the officer must have another basis for the arrest or it will not stand up in court.

4. Public Concerns

a. Noise complaints from residents near commercial and industrial uses are increasing in number as the City urbanizes.

b. For 1981-82, the Redding Police Department investigated 3,500 noise complaints most of which originated at night from within residential neighborhoods.

c. The Police Department does not have an efficient code enforcement procedure for quickly dealing with noise complaints; hence, some complaints go unresolved and others are resolved indirectly through other code violations.

d. Vehicle-cruising and car-stereo noise in the downtown area is intensifying.

e. The City does not provide enough guidance to developers and building designers who are required to comply with noise standards and mitigations.

## E. NOISE IMPACT ON SENSITIVE USES

### 1. Existing Noise Problems

These uses include hospitals, clinics, rest homes, schools and libraries. The location of all noise sensitive uses is illustrated on Map Exhibit F on page 72 and the results of a questionnaire survey are provided on page 73. The survey was conducted to determine if the uses are experiencing any noise problems and of the 29 institutions, only five responded with noise complaints.

TABLE 28
INSTITUTIONS AFFECTED BY EXISTING NOISE SOURCES

| | | |
|---|---|---|
| Shasta High School 2500 Eureka Way | Noise from aircraft overflights associated with Benton Air Park disturb classes sometimes even with the windows closed. | Unknown (See text comment below) |
| Parsons Junior High School 750 Hartnell Avenue | Noise from Interstate 5. Traffic disturbs classes and students cannot hear teacher. | 74 db(A) 100 feet east of I-5 pavement. |
| Cypress Elementary School 901 W. Cypress Avenue | Truck noise from Cypress Avenue. Traffic disturbs classes and students cannot hear teacher. | 69 db(A) 100 feet edge of pavement. |
| Grace Baptist School 3782 Churn Creek Road | Noise from traffic on Interstate 5 makes it difficult for students to hear teacher. | 74 db(A) 100 feet east of I-5 pavement. |
| Monte Vista School For Handicapped Children 3200 Adams Lane | Noise From I-5 causes children to loose interest in outdoor activities and the students tend to gravitate toward the I-5 fence to watch traffic. | 74 db(A) 100 feet east of I-5 pavement. |

The noise impact on Shasta High School is the result of aircraft overflights associated with Benton Air Park. The 1976 Noise Contour indicates that the school is well out of the 60 CNEL Noise level, but since the noise contours were developed, the aircraft traffic pattern may have changed to cause the CNEL contour to be extended outward. Perhaps the best way of evaluating this problem is to study traffic patterns and determine if overflights can be modified.

The noise impact on Parsons Junior High School and Grace Baptist School is verified by the high CNEL noise levels of I-5 traffic. Outside the classrooms, the CNEL level is approximately 67 db. In terms of loudness, this is about double the acceptable noise level. The exterior noise level should be approximately 55 CNEL. For classroom lectures, the interior level should be 35-40 db. (Source: Office of Noise Control, State Department of Health.)

In dealing with this noise impact, the only effective solution would be a 15-foot-high earth berm. Since there is plenty of undeveloped land between the schools and the freeway, on-site fill could be utilized to reduce the cost which is estimated to be about $37.50 a lineal foot. The exterior noise reduction would be about 10 db.

In the case of Cypress Elementary School, there are not many reasonable options. There is insufficient land for an earth berm and the only way of reducing truck noise is with a 10- to 15-foot-high block wall. One partial solution would be to orient some of the doors and windows away from Cypress Avenue. A more efficient mitigation would be to refit all windows with three-inch airspace panes and provide double entry doors with a vestible. The air conditioning system would have to also be revamped.

2. Projected Noise Problems

The projected (1980-2000) noise conditions for Parsons, Cypress and Grace Schools will only worsen. For Parsons and Grace Schools, the exterior classroom level will increase from 67 db to 70 db, which is primarily due to a doubling in traffic volume on I-5. This impact will make the previous earth berm recommendation more imperative if the schools are to function properly.

For Cypress Elementary School, the projected noise level will increase from 69 db to 70 db. The noise mitigations mentioned under Section F-1 would reduce some of the interior noise levels. A six-foot-high block wall would reduce the noise impact from automobiles but not trucks.

Live Oak School will experience a 4 db increase, which translates to about a 65 decibel level, just outside the classrooms. It should be possible to reduce this to a 35-45 interior level with window and door reorientation away from traffic noise on South Bonnyview Road. The projected impacts on other on other institutions are noted in Table 29 on page 41.

Enterprise High School and Shasta Convalescent will both experience a noise level increase of 64 db to 70 db caused by Churn Creek Road traffic. The noise level just out side the buildings will be about 67 db. Window and door reorientation will reduce some of the noise impact, but noise mitigations such as those recommended for Cypress Elementary School may be necessary.

TABLE 29
INSTITUTIONS AFFECTED BY PROJECTED INCREASE IN NOISE LEVELS

| Institution | Estimated 1980-2000 CNEL Noise Level (Source: 1982 Noise Survey) 1980 | 2000 |
|---|---|---|
| Shasta High School<br>2500 Eureka Way | Unknown (should be reevaluated) | Unknown (should be reevaluated) |
| Parsons Junior High School<br>750 Hartnell Avenue | 74db(A) at 100 feet east of I-5 pavement | 77db(A) at 100 feet east of I-5 pavement. |
| Grace Elementary School<br>3782 Churn Creek Road | 74db(A) at 100 feet east of I-5 pavement | 77db(A) at 100 feet east of I-5 pavement |
| Cypress Elementary School<br>901 W. Cypress Avenue | 69db(A) at 100 feet north of pavement | 70db(A) at 100 feet north of pavement |
| Live Oak School<br>South Bonnyview | 64db(A) at 100 from pavement | 68db(A) at 100 from pavement |
| Enterprise High School<br>3411 Churn Creek Road | 64db(A) 100 feet from pavement | 70db(A) 100 feet from pavement |
| Rother Elementary School<br>795 Hartnell Avenue | 74db(A) at 100 feet from I-5 pavement | 77db(A) at 100 feet from I-5 pavement |
| Shasta Convalescent Hospital<br>3550 Churn Creek Road | 64db(A) at 100 feet from pave-ment | 70db(A) at 100 feet from pave-ment |
| Monte Vista School<br>3200 Adams Lane | 74db(A) at 100 feet from I-5 pavement. | 77db(A) at 100 feet from I-5 pavement. |

The impact of I-5 traffic on Rother Elementary Junior High School and Monte Vista School will be the same as Parsons Junior High School. The recommended 15-foot-high earth berm should be effective in reducing the noise level. For all three schools, the cost of an earth berm could be financed as part of a redevelopment project involving tax increment financing.

3. Public Concerns

a. The noise impact on Shasta High School from overhead aircraft traffic associated with Benton Air Park should be evaluated to see

if any modifications in air-traffic patterns can be made to reduce the noise levels.

b. A 15-foot-high earth berm may be needed to lessen the existing and projected I-5 noise levels for Parsons Junior High, Rother Elementary and Grace Baptist Schools.

c. Traffic noise level impacts on Cypress Elementary, Live Oak and Enterprise High Schools, and Shasta Convalescent Hospital probably can only be mitigated by building insulation, and window and door reorientation.

## F. NOISE BARRIERS

### 1. Noise Barrier Design and Effectiveness

When the exterior noise level is so high (e.g., Leq of 70 db or greater) that it is difficult to reduce to an interior level of 45 db or when it is desirable to reduce the exterior noise level to enjoy outdoor activities, a noise barrier is necessary. To be effective, a noise barrier should incorporate the following design principles:

a. Be airtight (no holes) and five feet above the line of sight of the noise source.

b. Have a mass weight of two to four pounds per square foot. For more massive materials such as earth berms or concrete walls, this is not important. (Source: FHWA)

c. Visually opaque all portions of the noise source to the observer.

Another important principle is that noise barriers must be effective in reducing both transmitted noise through the barrier and diffracted noise which spills over the barrier. The diagrams below illustrate both of these physical properties.

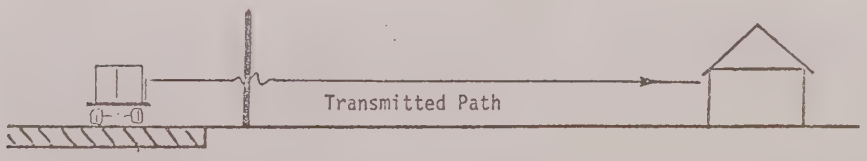



Figure 6

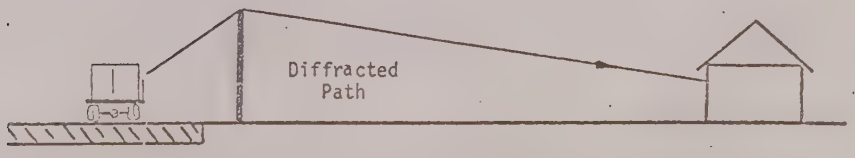
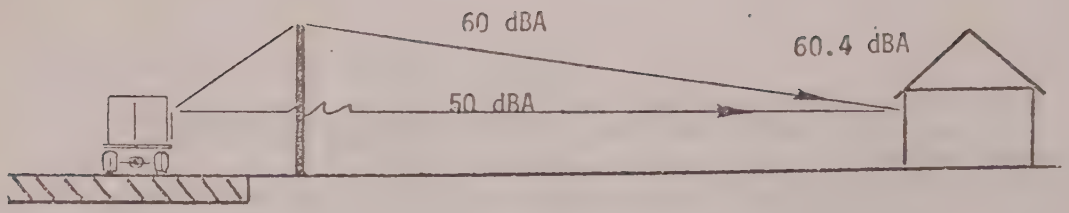



Figure 7




COMBINED EFFECT OF TRANSMITTED AND DIFFRACTED PATH
Figure 8

The effect of diffracted noise depends largely on the height of the noise barrier. For example, for every one foot of height above the line of sight of the noise source, a one decibel reduction may be achieved. The amount of transmitted noise through the barrier depends on the density of the barrier.

Figure 8 above, illustrates the combined effect of both these factors and shows that if the observer experiences a 75 db noise level from a truck, then the noise level may be reduced to 60, due to a 15 db loss in diffraction plus a 20 db loss in transmission.

Table 30, on the following page, illustrates the effectiveness of different types of noise barriers. As might be expected, the most reliable noise barrier is the earth berm which has the advantage of being able to deflect noise upward with the side slopes. In most cases, an earth berm that extends five feet above the line of sight of the noise source will provide a noise reduction of 10 decibels.

The disadvantages of the berm is the amount of fill and land required due to cross slopes and the overall cost which varies between 15 to 30 dollars per lineal foot for ten-foot-high berm, depending on the source of fill material. (See Figure 11 on page 48.)

When land right of way is limited, an earth berm with a block wall is also effective or a block wall by itself is effective. Both of these alternatives yield about a seven decibel noise reduction. Again, this disadvantage is the cost per lineal foot (See Figure 12 on page 48).

The least effective noise barrier is a standard six-foot-high, cedar fence or landscaping. Both of these solutions only visually screen the noise source; in effect, they provide a psychological barrier, but do not physically lessen noise levels.

An eight-foot-high, solid-wood fence (e.g., T & G planks) may be effective in reducing automobile noise levels by as much as ten decibels, but it has little effect on truck noise. Where truck traffic is very low, this may be a desirable and cost effective alternative over other barrier designs. Various design standards for six to eight feet high wall designs are presented in Figures 9 - 16 on pages 47 - 50.

# TABLE 30
## Approximate Noise Reduction of Various Walls
(Compiled by Redding Department of Planning & Community Development)

Sources: Fundamental and Abatement of Highway Traffic Noise Volume 2, Cal Trans

| Material | Height | Location | Noise Reduction in dbA (includes transmission loss and deflected loss) |
|---|---|---|---|
| Earth berm | 13 | I-75, Madison Heights, Michigan | 9 |
| Earth berm (landscaped) | 10 | I-94, U.S. 131 Interchange, Kalamazoo, Michigan | 7 |
| Earth berm (landscaped) with five-foot-wide shelf | 10-15 | I-84, West Hartford, Connecticut | 10 |
| Earth berm (landscaped) with four-foot-wide shelf | 7 | State Rt. 157 Boulder, Colorado | 6 |
| Earth berm, (landscaped) | 9 | I-495, Montgomery County, Maryland | 9 |
| Earth berm, 3:1 slopes | 10 | I-182, Pasco, Washington | 10 |
| Earth berm, 3:1 slopes | 10 | South Madison Beltline, Nob Hill, San Francisco | 12 |
| Earth berm; 2:1 slopes (landscaped) | 7-11 | Southeastern beltway, Columbia, South Carolina | 7 |
| Cedar post fence | 6 | Southfield interchange, Lincoln Park, Michigan | Little Effect On Noise; Survey Shows Good Psychological Effect. |
| 2 x 8 wood T & G planks | 13½ | I-75 Goddard Rd. Allen Park, Michigan | 10 |
| Timber wall (7½ timbers) | 10-15 | I-205, East Portland, Oregon | 8 |
| Boxed in double cedar fence 1 x 8 boards w 4" x 4" post. (has one-foot-wide air gap.) | 8 | U.S. 59, Houston, Texas | Autos Only No Effect On Trucks 50 feet from fence. |
| Concrete blockwall 8 x 8 x 16 | 10-15 | I-205, E. Portland, Oregon | 8 |
| Masonry Block | 6 | I-10, Lordsburg, New Mexico | Autos Only No Effect On Trucks. |
| Precast concrete panels | 10-23 | I-94, Prospect Park, Franklin Avenue Minneapolis, Minnesota | 11 |
| Earth berm and concrete block wall | overall 8 | Nevada | 7 |
| Earth berm and wall | varies | I-35w, Roseville, Minnesota | 5 Varies 11 |
| Earth mound and wall | varies | Rt. 3, South | 2 Varies 8 |
| Earth berm and precast polyester panel acoustic wall | varies | I-95, Howard County, Maryland | 10 |
| Landscaped earth berm with six-foot-high steel panel | 35 | I-95, Baltimore City, Maryland | 10 |
| Wooden wall with earth mounds 12" x 12" post with 2" x 8" pineboards nailed to both sides | 5-19 | I-35 West, Minnehaha Ck, Minn. | 10 Varies 15 |
| Plywood 3/4-inch thick with earth mound | 15 | Calculated (not tested) | 9 |
| Landscaping 33-foot-wide (dense forest, cannot see noise source) | 5* | Requires excellent soil, climate and maintenance | 2 5 |
| Row of buildings 40 - 65 percent solid row occupancy | 12-15 | -- | 3 |
| Row of buildings 65 - 90 percent solid row occupancy | 12-15 | -- | 5 |
| Continuous garage wall made of of 2 x 4 studs and stucco | 15 | -- | 7 |

Tops of trees must be Five Feet above line of sight of noise source.

## 2. Noise Barriers Within the City of Redding

Over the years, the City has imposed development conditions on residential, commercial and industrial projects to lessen the noise impacts on residential areas. In many instances, property owners have incorporated noise considerations in the preliminary design stage on voluntary basis. In other situations, City staff has encouraged redesign to include noise mitigating such as building set backs, orientation, landscaping and six-foot-high noise walls. In general, the types of noise mitigative conditions are dependent on the economic scale of the project. The economic consideration has been given more consideration than the effectiveness of noise mitigations as evidenced by the noise barriers in the City. A photographic noise survey of how some noise barriers and site-design techniques have been used by developers in Redding is provided in on pages 51 - 55.

In the case of a residential project where it is desirable to lessen the noise impact of automobile traffic, property owners have been required to install a six-foot-high block wall. See Photographs 8 and 10. This device is effective on automobile traffic when the grade is flat between the noise source and the noise receiver, and when there is substantial building setback to lessen the effect of deflected noise, which spills over the wall.

Where varying grade conditions exist and it is not economically practical to install a noise barrier (e.g., 10- to 15-foot-feet high wall or berm), the City has generally required developers to install a block-post-with-wood-insert fence, which provides some psychological benefit in reducing the overall effect of noise, but it has no physical effect in lessening the noise level.

The City's Land Use Element of the General Plan recommends landscaped corridors between residential and commercial-industrial uses to provide visual screening of noise sources. This recommendation has been incorporated into the conditions of approval on some projects. It should be noted that landscaped bufters are very difficult to administer and enforce by the City because they require constant maintenance.

In some instances, owners of residential projects have (either by design or accident) incorporated significant noise mitigations into their projects. A good example of this is illustrated by Photograph No. 1, which shows a substantial building setback from Lake Boulevard and minimal window exposure. An added bonus is the noise-softening devise of the lawn strip along Lake Boulevard. The net result of these mitigations is an overall reduction of traffic noise for the occupants of the apartment complex.

One very effective site-design device used by local developers is the placement of continuous garage walls along the freeway exposure, as shown in Photographs Nos. 5 and 6. This device is probably the most cost effective, but it is too infrequently used.

In the case of commercial or industrial projects adjacent to residential areas, the City has usually required a block-post fence with wood inserts or a chain-link fence with wood inserts. Both of these devices only provide psychological screening of the noise source.

Where visual security by passing police patrolmen is not necessary, then a more substantial opaque fence such as six-foot-high, block-post fence with the planting of evergreen trees may be installed. The evergreen trees provide the added benefit of eventually blocking out night parking-lot lights and security-yard lights.

The most effective noise barrier in the City is a 14-foot-high earth berm constructed along the south edge of a portion of Mountain Lakes Industrial Park, adjacent to a mobilehome subdivision (See Photograph No. 4). Even with the berm, the noise spills over the wall as evidenced by the fact that the City has received noise complaints from mobilehome residents. The berm could be made more effective by the placement of a five-foot-high block wall along the top.

3. Public Concerns

In reviewing the past history of the City's efforts of reducing residential noise levels through development controls, it appears that the City could play a much more significant role. The following summarizes the major areas of concern:

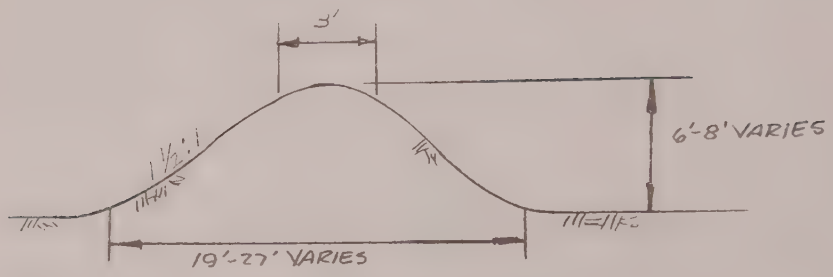
a. Noise barriers and site-design criteria have been aimed at either screening the noise source for psychological benefits or only reducing automobile-traffic noise.

b. Noise mitigations have only been imposed on projects that require a use permit, parcel map or subdivision map. This results in inconsistent walls and fences and lessens the effect of well designed sound walls, unless they are wrapped around the project.

c. The project owners have constructed block-wall noise barriers that do very little in reducing noise impact because they are not properly constructed or because they do not extend high enough to block out the line of sight of the noise source. In general, this is because of the high cost of sound walls.

d. A great deal of money could be saved in future noise-wall construction if site-design considerations (e.g. using continuous garage walls as a noise wall) were incorporated into projects in the design phase.

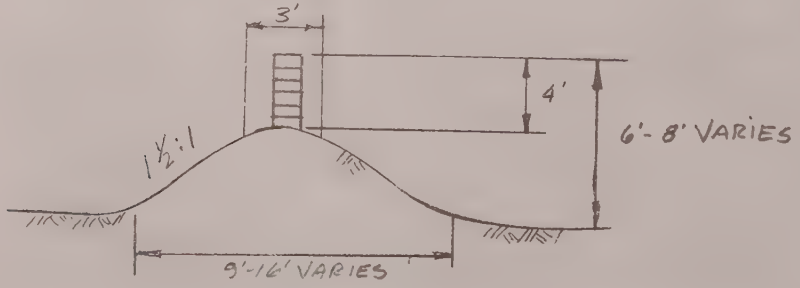
## EARTH BERM BARRIER




| SOURCE OF FILL MATERIAL (Hydro-Seeded) | COST PER LIN. FT. (1982 Cost Estimates) | dbA REDUCTION | DECIBEL REDUCTION (FOR AUTOS ONLY) PER LINEAL FOOT COST |
|---|---|---|---|
| On Site | 6 feet high: 6.00 | 6 | 1.00 |
| | 8 feet high: 15.00 | 8 | .53 |
| Off Site | 6 feet high: 10.00 | 6 | .60 |
| | 8 feet high: 25.00 | 8 | .32 |

FIGURE 9

## BLOCK WALL & EARTH BERM BARRIER

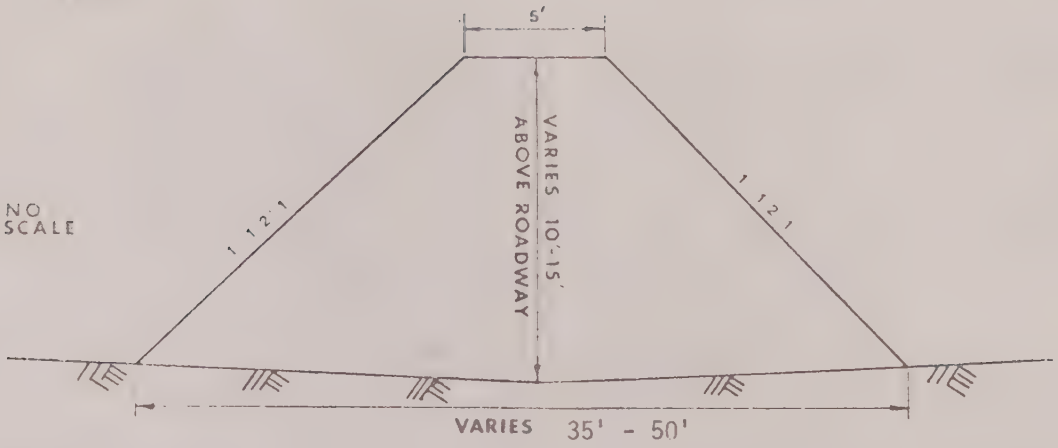



| SOURCE OF FILL MATERIAL (Landscaped) | COST PER LIN. FT. (1982 Cost Estimates) | dbA REDUCTION | DECIBEL REDUCTION (FOR AUTOS ONLY) PER LINEAL FOOT COST |
|---|---|---|---|
| On Site with 4' high blockwall | 6 feet high: 14.00 | 6 | .43 |
| | 8 feet high: 23.00 | 8 | .35 |
| Off Site with 4' high blockwall | 6 feet high: 18.00 | 6 | .33 |
| | 8 feet high: 33.00 | 8 | .24 |



FIGURE 10

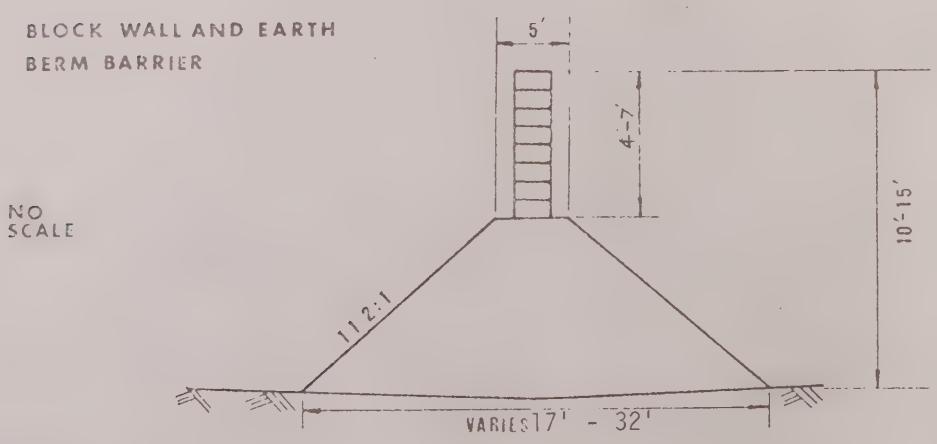
EARTH BERM SOUND BARRIER




| SOURCE OF FILL MATERIAL (Hydro-Seeded) | COST PER LIN. FT. (1982 Cost Estimates) | dbA REDUCTION | DECIBEL REDUCTION (FOR AUTOS & TRUCKS) PER LINEAL FOOT COST |
|---|---|---|---|
| On Site | 10 feet high: 15.00 | 7 | .46 |
| | 15 feet high: 37.50 | 10 | .26 |
| Off Site | 10 feet high: 30.00 | 7 | .23 |
| | 15 feet high: 70.00 | 10 | .07 |

FIGURE 11

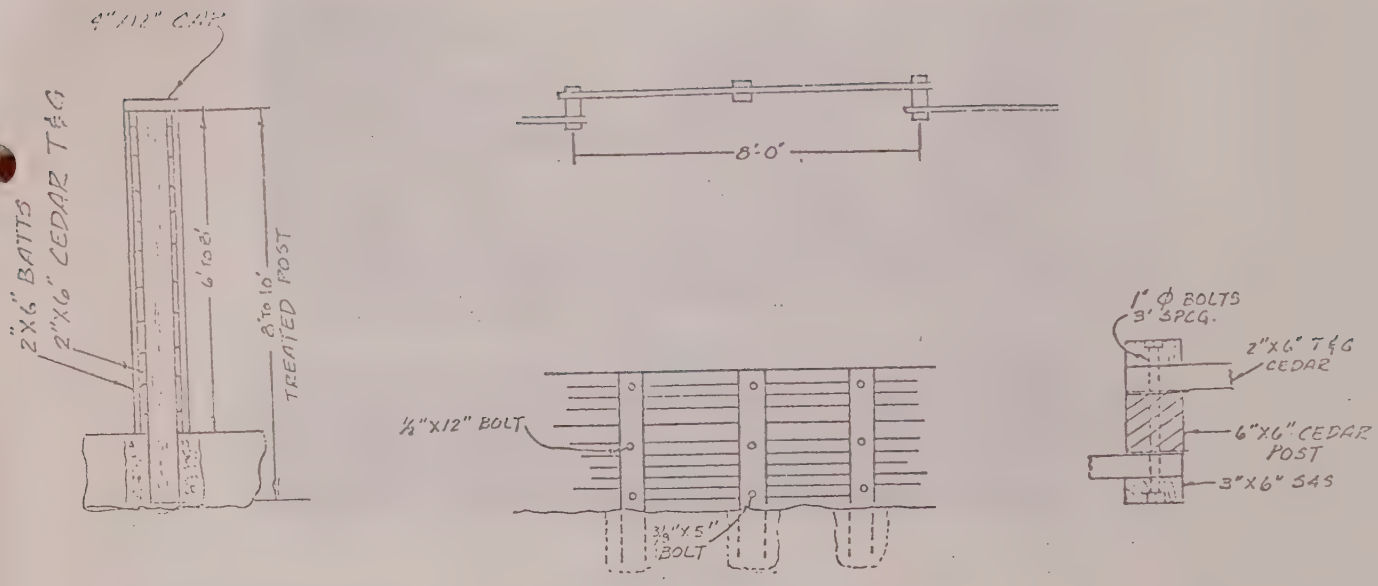
BLOCK WALL AND EARTH BERM BARRIER




| SOURCE OF FILL MATERIAL (Hydro-seeded) | COST PER LIN. FT. (1982 Cost Estimates) | dbA REDUCTION | DECIBEL REDUCTION (FOR AUTOS & TRUCKS) PER LINEAL FOOT COST |
|---|---|---|---|
| On Site with 4' high block wall | 10 feet high: 23.20 | 7 | .30 |
| | 15 feet high: 32.20 | 10 | .31 |
| Off Site with 7' high block wall | 10 feet high: 40.10 | 7 | .17 |
| | 15 feet high: 55.10 | 10 | .15 |



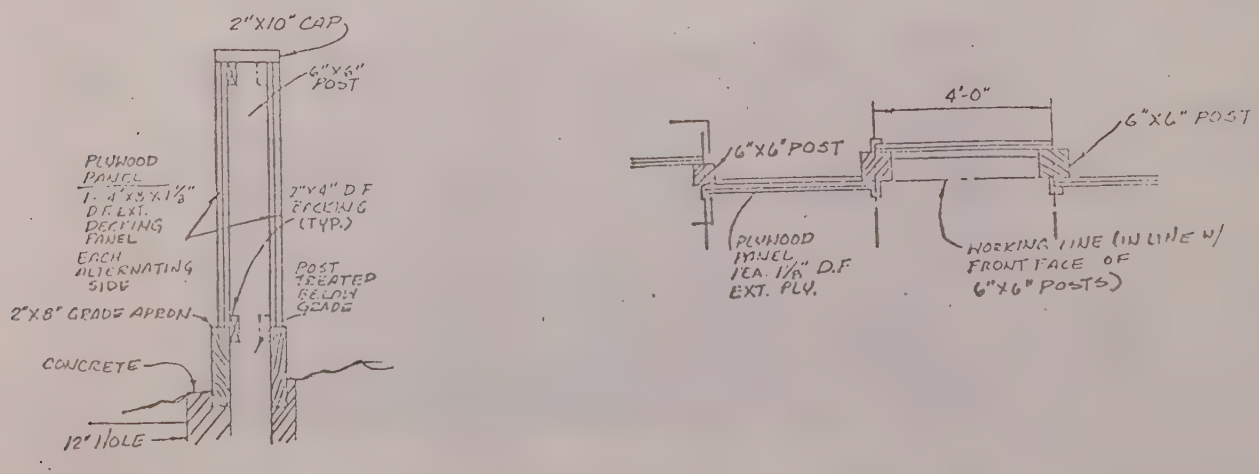
FIGURE 12




| MATERIALS | COST PER LIN. FT. (1982 Cost Estimates) | dbA REDUCTION | DECIBEL REDUCTION (FOR AUTOS ONLY) PER LINEAL FOOT COST |
|---|---|---|---|
| 6 X 6 post @ 8' on center<br>2 X 6 T & G Cedar #3 or better | 6 feet high: 32°°<br>8 feet high: 41°° | 8<br>10 | .25<br>.24 |

Notes add 3°° /. Lin. Ft. for paint

FIGURE 13

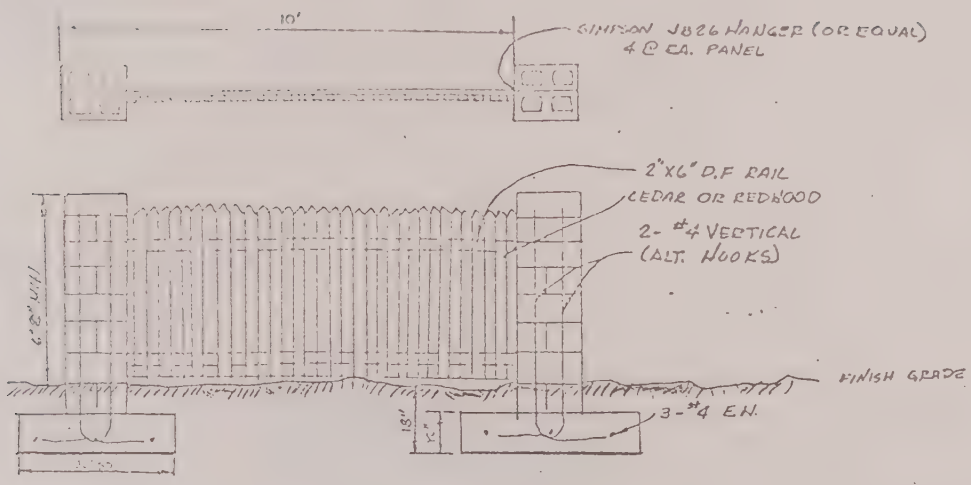



| MATERIALS | COST PER LIN. FT. (1982 Cost Estimates) | dbA REDUCTION | DECIBEL REDUCTION (FOR AUTOS ONLY) PER LINEAL FOOT COST |
|---|---|---|---|
| 6 X 6 post @ 4' on center<br>1 1/8 Douglas Fir Plywood decking parcels | 6 feet high: 25°°<br>8 feet high: 28°° | 8<br>10 | .32<br>.36 |



FIGURE 14

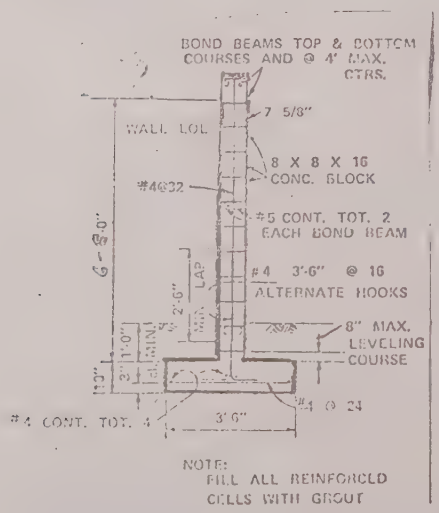
GRAPE STAKE - BLOCK PILASTER

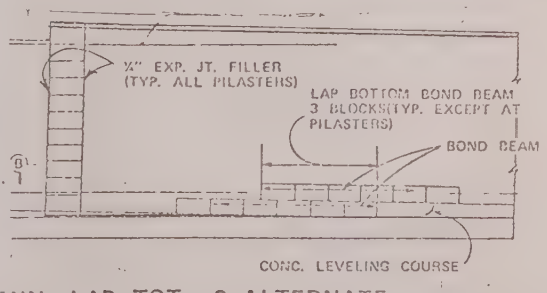


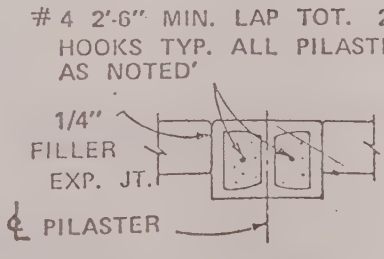

NOT RECOMMENDED

| MATERIALS | COST PER LIN. FT. (1982 Cost Estimates) | dbA REDUCTION | DECIBEL REDUCTION (FOR AUTOS ONLY) PER LINEAL FOOT COST |
|---|---|---|---|
| 6 X 8 X 16 Slump Block pilasters Cedar or Redwood Railing W/2 X 6 Latteral bracing | 6 feet high: 20°° | ø | None |
| | 8 feet high: N/A | ø | None |

FIGURE 15




| MATERIALS | COST PER LIN. FT. (1982 Cost Estimates) | dbA REDUCTION | DECIBEL REDUCTION (FOR AUTOS ONLY) PER LINEAL FOOT COST |
|---|---|---|---|
| 6 X 8 X 16 Slump Block (grouted & reinforced) | 6 feet high: 43°° | 8 | .19 |
| | 8 feet high: 55°° | 10 | .18 |



FIGURE 16

Photograph # 1

Location: Apartment complex is located on the north side of Lake Boulevard.

Effectiveness: This is an excellent example of how a building setback and site design can be used to reduce noise level. Also notice that the window exposure on the front elevation is minimal. A rule of thumb to remember is that for every doubling of the distance from the noise source a 3-4 decibel reduction possible.

Photograph # 2

Location: Earth Berm South end of the Mountain Lakes Industrial Park adjacent to the Mobilhome Subdivision.

Effectiveness: This earth berm is very effective in reducing industrial noise sources in the Mountain Calus Industrial Park. It is appromimately 14 feet high, 40 feet wide

Photograph #3

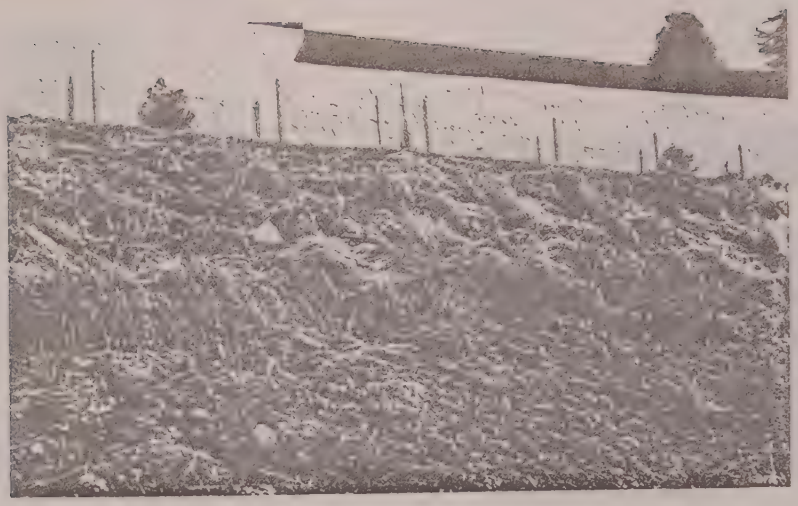
Location: West side of I-5, north of Cypress Ave. This four year old cedar fence was installed to visually screen an apartment complex from auto traffic on I-5.

Effectiveness: Although cedar itself is a durable wood product, the method of fence construction is faulty. This fence could have been made durable with proper anchor post and latteral bracing. The fence provides no noise attenuation but it does provide some visual screening; however unless frequent maintenance occurs, the fence will collapse.

Photograph #4

Location: Same location as photograph above. This photograph further illustrates the ineffectiveness of cedar fencing without anchor post and lateral support. Also the poor quality grade of cedar is evidenced by the vertical split cracks and holes.

Effectiveness: The fence provides some visual screening, but the same screening could have been accomplished with vegetation with the advantage of having more visual appeal.



Photograph #5

Location: Eastside of I-5, 2 miles south of Hartnell Avenue bridge.

Effectiveness: This continuous garage wall is a very effective means of dealing with noise, visual screening and provided covered parking. It also eliminates the added cost of a noise wall.

Photograph #6

Location: Same as above.

Effectiveness: Although the continuous garage wall is effective as noted above, it was not employed properly here. Through good site planning, the garage wall could have been used to screen the apartment units.

Photograph #7

Location: Along the west side of I-5 north of the Cypress Avenue bridge.

Effectiveness: The row of garages along the I-5 right of way provides an excellent visual screen but the noise reduction effectiveness is lost due to the exposure of the southend. The blockwall provides no noise reduction qualities and the same security and visual screening could be accomplished with wood slates in a chain link fence.

Photograph #8

Location: Along Mountain View Drive, east of I-5.

Effectiveness: This five foot high blockwall was installed as a noise barrier, but the insufficient height leaves the windows exposed and the forshortened length leaves one entire unit completely exposed.

Photograph #9

Location: This wall was installed along the south side of Lake Blvd. as a noise barrier against Lake Blvd. auto traffic.

Effectiveness: Although the fence is constructed of excellent noise attenuation material (conc. block), its effectiveness is greatly lessened by the decorative open blocks. The fence is a good long term solution to screen auto traffic, but has no effect on screening truck traffic or reducing truck noise.

Photograph #10

Location: This wall was installed along the east side of I-5, south of the Hartnell Avenue bridge.

Effectiveness: This five foot high slump block wall has no effect on reducing the noise level of even auto traffic and it provides very little screening effect because of the dimenished height relative to the windows.

## VI. OPTIONS TO IMPROVE THE CITY'S NOISE ENVIRONMENT

### A. MAINTAIN THE ADOPTED NOISE ELEMENT

The current Noise Element was adopted in 1974. New State laws have made some of the goals unnecessary. One of the major criticisms of the Element is that it does not comply with the State requirement of basing noise contours on either the CNEL or Ldn noise metric.

A second weakness of the present Noise Element is that it doesn't consider the updated noise contours and policies of the draft 1982 Municipal Airport Plan. To maintain the 1974 noise contours could cause an economic hardship on the community because the contours encompass more noise impacted properties that would have to be purchased to protect the Airport. The reason for the reduction in the limits of noise contours of the proposed Element is the development of quieter aircraft engines. Another criticism is that the Element does not provide any guidance to developers, City staff or the Planning Commission on what are efficient, economic and reasonable noise mitigation standards.

The land-use noise standards of the 1974 Noise Element are based on ambient noise levels for day and night. The ambient noise, according to the Element, is the lowest background noise level exclusive of occasional peak levels. Although this measurement is satisfactory for most residential neighborhoods, it does not consider that noise complaints generally are because of excessive peak noise levels.

The goals of the 1974 Noise Element, as depicted on the following page, were reasonable at the time of adoption; but since then, conditions have changed along with State and Federal standards. An overall critique of the goals is provided on the following page.

### B. MODIFY THE PROPOSED NOISE ELEMENT TO BE LESS NOISE RESTRICTIVE

To modify the proposed Noise Element to be less noise restrictive would mean that the data base of the Element is in error or that the proposed noise standards and noise mitigations are too restrictive.

This option would provide a liberal approach to the noise environment. It would also allow more flexibility in terms of enforcement and noise mitigation.

One great disadvantage is that it would permit exterior residential noise levels to be louder, which would in turn mandate more costly building noise mitigations to maintain the maximum interior noise levels of the State and Federal governments.

### C. MODIFY THE PROPOSED NOISE ELEMENT TO BE MORE NOISE RESTRICTIVE

This option implies that the noise environment could be made even quieter than the proposed noise element suggest. The goals themselves would not have to be modified, but the noise standards would have to be more restrictive than recommended in the Land Use Noise Standards in Table 5 on page 19.

| 1974 Noise Element Goals | Critique |
|---|---|
| 1. Highway noise to be controlled and prevented through combinations of site/route location and design, land-use controls, building-insulation requirements, screening measures and speed limits. | Implementation of this goal has been limited to projects requiring City approval. The effectiveness of the noise controls are generally not checked. |
| 2. Building Code amendments to specify noise insulation performances required in multifamily dwellings, to give privacy. | The implementation of this goal has been accomplished by State mandate under Title 25 of the California Administrative Code. |
| 3. Critical-area designation for zones associated with major noise sources in which a graduated system of noise insulation performance in building exterior shells would be required, keyed to achieve an interior limit; primary attention to be given to residences, schools, hospitals and all buildings constructed wholly or in part by use of public funds. | This goal has not been implemented. |
| 4. Establishment of ambient-noise zones in the form of comprehensive noise ordinances according to the need for quiet associated with each land-use category. | This goal has not been met. |
| 5. Provide necessary policy statements so that property owners and developers may reasonably predict community development decisions. | This goal has partially been satisfied by the adoption of the 1995 projected noise contours. |
| 6. Enforce the Motor Vehicle Code as it applies to excessive noise. | Implementation of this goal was vigorously pursued by the Police Department, but a recent court case has hampered enforcement by restricting the use of noise meters on certain vehicles. |
| 7. Review City-operated activities to ensure that noise has been reduced to the lowest possible level. | Environmental-review procedures on City projects have generally guaranteed that this goal has been met. |
| 8. Review and reevaluate existing traffic-flow systems to minimize traffic noise generated through stops and starts and to adjust traffic routes away from residential or critical areas. | Environmental-review procedures have satisfied this goal. |
| 9. Develop regional agreements for zoning and soundproofing to reduce noise incompatibilities in areas adjacent to the City. | This goal has not been implemented. |

The recommended noise standards were based on existing noise levels and noise studies and comparisons of other communities. To make the noise standard more restrictive would mean that City-wide the existing noise environment is far too loud. This in turn would mean that the noise survey presented in Tables 13 through 22 on pages 92 to 101 would have to be redone to include longer periods of monitoring because the standards and the noise ordinance would be scrutinized by the courts more carefully due to their greater restrictive nature. This action may involve more staff time, additional noise recording equipment including a graphic recorder and overall a great deal of expense. It may also create unnecessary public controversy and long-term legal expense.

A more restrictive noise element could also be accomplished by making the noise mitigations for sound walls and buildings mandatory on all noise impacted projects. The proposed noise element recommends that the noise mitigations be used only as implementation guidelines to developers, City staff, and the Planning Commission.

To mandate more stringent noise mitigations may impose excessive economic hardships on certain projects and adversely effect the affordability of the City's housing stock.

To suggest that a quieter noise environment is a greater priority than proposed by Option 3 implies that the overwhelming benefits merit more staff time, public expense, public controversy and higher housing cost.

D. ADOPT THE RECOMMENDED NOISE ELEMENT

The justification for this option has been presented in the text of the document itself. The selection of this option initially involved many more alternatives than presented above.

The noise standards were modified numerous times by staff to reach what is considered reasonable noise levels. They were tested against the existing noise environment and were reviewed for adequacy by the Office of Noise Control, State Department of Health.

The draft goals, objectives and policies are the result of staffs understanding of the Community's noise problems. In effect the Noise Element has been sculptured to meet the needs of the City.

Compared to other urban communities, Redding's overall noise environment is quieter; but by the year 2000, it is anticipated that the average daily traffic volume on almost all major four-lane streets throughout the plan area will more than double. This, in effect, will cause existing noise levels along these street corridors to be one-half to one times louder. Unless noise mitigations are built into new residential projects as they develop, the deferred cost of noise mitigations may be beyond affordability.

Other sources of noise-level increases that are anticipated will result from increased human activity. For example, it is believed that by the year 2000 the population will more than double, which means that there will be twice as much residential urban activity including loud stereos, lawn mowers, and home operation of power tools. Noise levels from industrial and commercial land use will also intensify and add to the overall noise level of the community.

These anticipated conditions can only be dealt with through a comprehensive noise element that is based on realistic goal policies, objectives and standards and action programs of implementation.

## A. OVERALL GOALS

In anticipation of increased urban noise levels, the goals of the Noise Element are to:

1. Anticipate noise problems before they occur and mitigate them as the community urbanizes.

2. Educate the public through the planning process about the adverse characteristics of noise so that they will understand the need to avoid excessive noise.

3. Adopt attainable and enforceable land-use noise policies and standards that reflect what the community wants.

4. Assist property owners in noise mitigation by identifying economical, efficient, and esthetically pleasing ways of meeting City, State and Federal noise standards.

5. Safeguard the two public airports from intrusion by uses that limit the expansion of air service to the Northern California region by recognizing the vital service provided by these airports and the need to maintain a level of operations necessary to satisfy existing and future aviation requirements of the user communities.

6. Permit persons who live, work, and own property in or near high airport noise areas to enjoy a maximum amount of freedom from noise without compromising the functions of the airports.

7. Lessen the noise impact of railroad operations on nearby residential areas through land-use planning and noise mitigations.

8. Highway noise to be controlled and prevented through combinations of site/route location and design, land-use controls, building-insulation requirements, screening measures and speed limits.

9. Provide necessary policy statements so that property owners and developers may reasonably predict community-development decisions.

10. Establish quiet noise zones in the form of comprehensive noise ordinances for noise sensitive uses such as hospitals, schools, and rest homes.

B. OBJECTIVE: LAND USE NOISE STANDARDS

Adopt noise standards that are reasonable to attain and reflect what the community wants and meet all State and Federal requirements.

1. Exterior Land Use Noise Standards

a. Adopt the land-use noise standards in the table below along with the land-use criteria.

TABLE 5

MAXIMUM RECOMMENDED LAND-USE NOISE STANDARDS

| Land-Use Category | CNEL | Day Leq (7am -10pm) | Night Leq (10pm-7am) |
|---|---|---|---|
| Single Family Zoning District | 60 | 60 | 50 |
| Multiple Family Zoning District | 60 | 60 | 50 |
| All Commercial Zoning Districts | 65 | 65 | 55 |
| All Industrial Zoning Districts | 70 | 70 | 60 |

2. Criteria for Application of Noise Standards

The maximum noise level standards above are applicable to the property lines of uses within the following zoning districts:

The determination of which noise metric to apply, CNEL or Leq, should be based on the metric that produces the most restrictive condition.

a. Single Family Zoning District: Includes any zoning district regardless of density in which single-family home ownership is encouraged. This includes planned developments and attached dwellings. When a Single Family Zoning District or property boundary abuts a Commercial or Industrial District or property boundary, then the noise standards for the Single Family District should prevail at the property boundary.

b. Multiple Family Zoning District: Includes any zoning district in which occupancy is largely limited to renters regardless of density. When a Multiple Family Zoning District or property boundary abuts a Commercial or Industrial Zoning District or property boundary, then the noise standard of the Multiple Family Zoning District should prevail at the property boundary.

c. Commercial Zoning Districts: Includes all Commercial Zoning Districts (C-O, C-1, C-2, C-4 and C-5) with the exception of the "C-3" Heavy Commercial Service District, which for the purpose of this element is included in the Industrial Zoning District Noise Standards category.

d. Industrial Zoning District: Includes all manufacturing and industrial uses within the "P-I" Planned Industrial District and the "M-2" Industrial District. Also included is the "C-3" Heavy Commercial Light Industrial District. When any industrial district abuts another zoning district with more restrictive noise standards, then the noise standards of the more restrictive district should prevail at the zoning district boundary.

e. "U" Unclassified Districts: For areas zoned "U" Unclassified, the noise standards should be applied to the property boundary of the specific use. The noise standards to be used should be based on the General Plan land-use descriptions in which the use would be permitted.

f. Consistency of Noise Standard with General Plan Classification: In no case should the noise standards be applied to a use or project where an inconsistency between the land-use classification of the General Plan and zoning district in which it is located is created.

g. Peak Noise Standards: Except for peak noise or impulsive sound from within a residential area, no peak noise levels for any commercial or industrial use should spill over into a residential area which would cause the residential noise standards to be exceeded by more than 3 db for a 15-minute Leq monitoring period.

Peak noise levels from within a residential area should be established by a City Noise Ordinance.

Peak noise standards for vehicles on any public street are set forth in the California Vehicle Code and enforced by the Redding Police Department and California Highway Patrol.

h. Motels, Hotels, and Apartments: In specific land-use projects dealing with motels, hotels and apartments, the residential interior noise standards should prevail regardless of the zoning district in which they are located. The noise standard should be applied to the project's boundary or property boundary of the project.

i. Determination of Noise Compliance with Standards: The determination of compliance with the noise standards of this section should be based on a 15-minute Leq day and night measurement assuming no unusual noise conditions exist which would tend to make such a short period of monitoring invalid in terms of not approximating an Leq for one-hour periods. Where this occurs a longer monitoring period of 1-, 8- or 24-hours may be necessary.

j. Acoustical Analysis Requirement: New residential structures to be located within a existing or projected CNEL contour interval of 60 db or greater should require an acoustical analysis showing that the structure has been designed to limit interior intruding noise levels to the standards discussed in Section 2-L:

k. Noise Contours: The determination for which areas of the City may be subject to the requirement of a noise analysis under Section B-2j., above should be based upon the noise contour interval data provided in the technical appendices of the Noise Element. If a developer chooses to disagree with the contour data of the tables then he may provide independent noise monitoring data using the same noise metric and following procedures outlined in Title 24 of the California Administrative Code.

l. Interior Dwelling Unit Noise Standards: Exterior noise levels outside of any dwelling unit (located within a zoning district intended for such use) should not be the principal cause for the interior noise level to exceed a 15-minute Leq of 45 db in sleeping areas and for other habitable areas of the dwelling unit, the noise level should not exceed a CNEL of 45 db. In both instances. it is assumed that all windows are closed.

m. Noise Standards For Sensitive Uses: The exterior noise levels outside of any noise sensitive land use including hospitals, rest homes, clinics, schools and libraries should not cause the interior levels to exceed an Leq of 45 db except in sleeping areas, the maximum CNEL should not exceed 35 db with all windows closed.

n. Site Plan Review Criteria: For those areas that may be impacted with excessive noise as determined by the projected noise contours of the Element, site plan review criteria should be attached to the zoning district of the area to implement the requirement for a noise analysis and mitigations.

o. Noise Mitigation Devices: The noise mitigation devices of the Noise Element including barrier design, building setbacks and materials in structures should be applied in planning residential developments when the units will be impacted with noise.

C. OBJECTIVE: REDDING MUNICIPAL AIRPORT NOISE POLICIES

Incorporate the following policies of the Redding Municipal Airport Area Plan into the Noise Element and develop a five-year action program to implement the policies:

1. Designate certain land developed with incompatible uses within the south Inner Approach Zone, as shown on the Area Plan, for Airport acquisition as availability of funds permits. The designation of "Acquisition" is made based on the concerns of noise impact and safety and the potential for conflict between airport operations and future users of the affected properties.

2. Designate land within the 1981-2000, 65 CNEL contour, as shown on noise contour Map Exhibits B and C on pages 31 and 32 for nonresidential use in order to attain consistency with State Noise Standards in effect January 1986.

3. Notify owners of developed residential property within the designated Airport acquisition area and the designated industrial area subject to the 1981, 65 CNEL of the City of Redding's willingness to purchase, subject to availability of funds, requesting first refusal purchase opportunity.

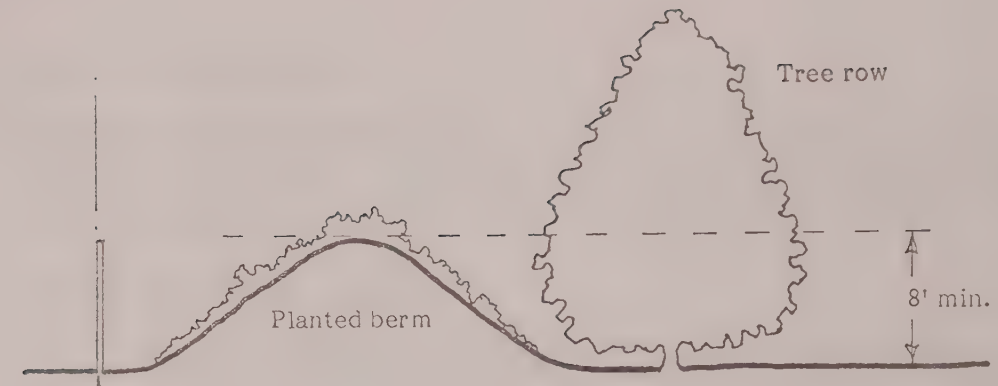
   Priority:
   a. Residential units on Skyway Street and Fig Tree Lane sites designated to be acquired and retained as Airport property and Anderson Grange.
   b. Residential units within the Inner Approach Zone.
   c. Residential units within the 1981 65 CNEL contour.
   d. Vacant and nonresidential property designated to be acquired and retained as airport property.

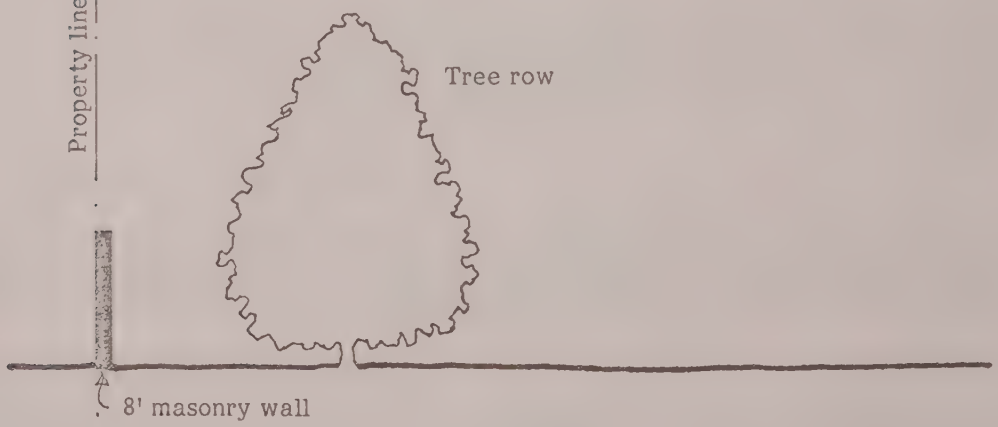
4. If the number of owners wishing to sell exceeds the funds available, a priority list should be established and should remain in force until all properties receiving priority 1, 2, 3, or 4 on the initial list have been acquired or converted to a compatible use, or the request to purchase has been withdrawn.

5. Property acquired that is not designated for retention as Airport property should be resold or leased for a compatible use, subject to limitations established by the source of funds with which it was purchased.

6. Require noise agreements as a condition of use permit, subdivision, or parcel map approval within the 1981-2000, 60 CNEL contour (shown on the Airport Area Plan map) and within the Traffic Pattern Zone (shown on Figure 5 of the Airport Report). The agreements should preclude suits for damages or to enjoin Airport operations to limit noise and should run with the land.

7. Require construction of walls and/or berms as depicted on Figure 17 on page 64 adjacent to freeways and expressways in residential areas to mitigate noise impacts where CNEL noise levels will exceed prescribed State standards.



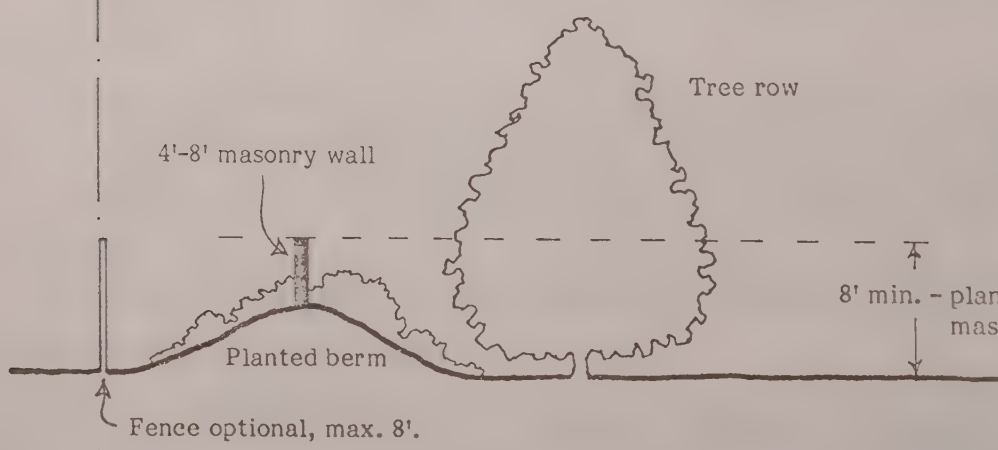




Figure 17 ALTERNATIVE BUFFERING REQUIRED FOR A COMMERCIAL OR INDUSTRIAL USE ADJOINING AN "R" DISTRICT

D. OBJECTIVE: BENTON AIR PARK

Study and evaluate the noise impact of air traffic of Benton Air Park on schools and residential areas to be sure that the 1976 and 1995 noise contours reflect accurate measurements for existing projected conditions. This objective would be achieved by setting aside funds or applying for FAA funds to do the study by 1985.

E. OBJECTIVE: ENTERPRISE SKY PARK

Maintain the present level of airport activity for Enterprise Sky Park through land-use planning so that noise levels do not increase to the point of impacting residential areas.

1. Standard

Recognize Enterprise Sky Park as a nonconforming use on the General Plan by establishing a land-use pattern that will not conflict with the current activity of the airport and will not permit the airport to expand its air-traffic operations beyond the 1982 level of operations which includes 60-based aircraft.

F. OBJECTIVE: SKY RANCH AIRPORT

Classify the airport property as "Industrial" or "Commercial" with a provision that aircraft activity should be limited to on-site industrial or commercial activities or reclassify the property to a residential classification and seek termination of the airport activity.

G. OBJECTIVE: RAILROAD OPERATIONS

Classify areas adjacent to railroad tracks with land-use patterns that are compatible; and where no other alternative exist, require a noise analysis and mitigation measure if needed to satisfy the following noise standards.

1. Standards:

a. For developments within the 60 CNEL Contour or within 620 feet of the railroad tracks, require a noise analysis as stipulated under Title 25 of the California Administrative Code. The analysis should specify any necessary noise mitigations to produce an interior noise level specified for the use in the Noise Element.

b. The noise mitigation standards presented in the Noise Element should be employed when applicable to new development projects.

H. OBJECTIVE: TRAFFIC NOISE IMPACTS

Existing and projected traffic noise impacts of highways, Interstate 5 and major four-lane streets on land use should be mitigated when possible.

1. Standards and Policies

a. The recommended noise mitigations and standards of the Noise Element should be incorporated into noise impacted developments as

determined by noise monitoring and for projects that are within the projected 60 CNEL contour interval of all streets and highways including those listed in Tables 7 through 12 on pages 85 through 90.

b. The Noise barrier designs presented on pages 47 through 50 should be utilized based on their applicability in terms of cost, efficiency and aesthetics.

c. The noise reduction standards for dwellings presented on pages 76 through 83 should be utilized when applicable and when recommended under State and Federal laws in Title 25 of the California Administrative Code.

d. Encourage the police department to reestablish an on-going policy of vehicle noise abatement program through the use of noise meters and issuance of citations for faulty mufflers. Such a program should be modified so that it doesn't include trucks or cars with snow tires or mud tires. The program should also depend on the availability of police department personnel.

## I. OBJECTIVE: NOISE SENSITIVE USES

Adopt a land-use and circulation pattern where feasible that will minimize impacts on noise sensitive uses such as schools, libraries, hospitals, clinics and rest homes; and develop noise mitigation recommendations for noise sensitive uses.

### 1. Policies

a. Discourage the development of land-use noise generators adjacent to noise sensitive uses through the establishment of compatible zoning districts.

b. Advise the following noise sensitive uses that they may experience much higher noise levels from projected traffic volumes on existing streets so that they can build into their long-term capital-improvement program, the cost of noise mitigation measures and assist these agencies and institutions in applying for Federal or State aid to mitigate the impacts with the recommended mitigation measure of the Noise Element.

- Shasta High School
- Parsons Junior High School
- Cypress Elementary School
- Grace Baptist School
- Monte Vista School for the Handicap
- Parsons Junior High School
- Grace Baptist Elementary Sch.
- Cypress Elementary School
- Live Oak School
- Enterprise High School
- Rother Elementary School
- Shasta Convalescent Hospital

J. POLICY: RESOLUTION OF NOISE COMPLAINTS

Adopt a noise ordinance similar to the one on page 102 that will address maximum permissible peak noise levels and will permit the Police and Planning departments to deal effectively with noise complaints and budget the necessary funds to purchase one additional noise meter for the Police Department and two noise level graphic recorders, one for each department.

K. POLICY: NOISE IMPACTED DEVELOPED AREAS

In those urbanized noise-impacted areas that are considered to be blighted in terms of the State and Federal redevelopment criteria, the City could include such areas as part of a redevelopment project. This policy may permit the construction of earth berms or sound walls within the right of way of Caltrans when there is insufficient privately owned land.

## VIII. RECOMMENDED ACTIONS THE CITY SHOULD TAKE

The following are a list of specific actions for the City to accomplish within five years after adoption of the Element:

1. Initiate the inclusion of site-plan-review criteria of the Noise Element into zone change requests for those areas that are projected to be impacted by noise.

2. Adopt a noise ordinance within one year of the adoption of the Noise Element, which includes maximum peak noise level requirements.

3. Set aside funds to purchase an integrated noise level meter for the Police Department and two noise level graphic recorders (one for the Planning Department and one for the Police Department).

4. Develop City ordinances guidelines for the Police Department so they can once again use noise meters in the issuance of vehicle noise violations.

5. Provide property owners with a list of consultants and designers who have the noise equipment and expertise to fulfill the requirements of the Noise Element.

6. Where appropriate include the standards and mitigation devices in development projects which require discretionary City approval.

7. Do not encourage Enterprise Sky Park to expand beyond a "basic utility one" airport or increase the number of aircraft based at the Airports.

8. As FAA funds become available, acquire the noise-impacted properties recommended by the Redding Municipal Airport Area Plan.

9. Designate a member of City staff to work with property owners and consultants in meeting the requirements of the Noise Element.

## APPENDIX A
## Glossary of Terms

**A-Weighted Sound Level:** The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

**Ambient Noise Level:** The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

**CNEL:** Community Noise Equivalent Level. The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 p.m. to 10 p.m. and after addition of 10 decibels to sound levels in the night before 7 a.m. and after 10 p.m.

**Decibel, db:** A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

**Equivalent Energy Level, $L_{eq}$:** The sound level corresponding to a steady state sound level containing the same total energy as a time varying signal over a given sample period. $L_{eq}$ is typically computed over 1, 8, and 24 hours sample periods.

**Intrusive Noise:** That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency and time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.

**$L_{dn}$:** Day-Night Average Level. The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of 10 decibels to sound levels in the night before 7 a.m. and after 10 p.m.

Note: CNEL and $L_{dn}$ represent daily levels of noise exposure averaged on an annual basis, while $L_{eq}$ represents the equivalent energy noise exposure for a shorter time period, typically one hour.

**Noise Disturbance:** Any sound which after being monitored is determined to: (a) endanger the safety or health of human beings, or (b) annoys or disturbs reasonable persons of normal sensitivities,

or (c) endangers personal or real property, or (d) violates the noise land-use standards of the Noise Element. Compliance with the quantitative standards as listed in the Noise Element shall constitute elimination of a noise disturbance.

Noise Exposure Contours: Lines drawn about a noise source indicating constant energy levels of noise exposure. CNEL and $L_{dn}$ are the metrics utilized herein to describe community exposure to noise.

$L_{10}$: The A-weighted sound level exceeded 10 percent of the sample time. Similarly $L_{50}$, $L_{90}$, $L_{99}$, etc. ($L_{10}$ is almost equivalent to the Ldn + 3 db.) Note: The Ldn approximates the Ldn + 3 db.

## APPENDIX B
## SOURCES CONSULTED


1. California Laws and Regulation Relating to Noise Control, Office of Noise Control, State Department of Health, 1980.

2. Noise Element of the Shasta County General Plan, draft 1982.

3. Redding General Plan Noise Element, 1974, Redding Department of Planning and Community Development.

4. State of California General Plan Guidelines Office of Planning and Research, January, 1980.

5. Guidelines for the Preparation and Content of Noise Elements of the General Plan, Office of Noise Control, February, 1976.

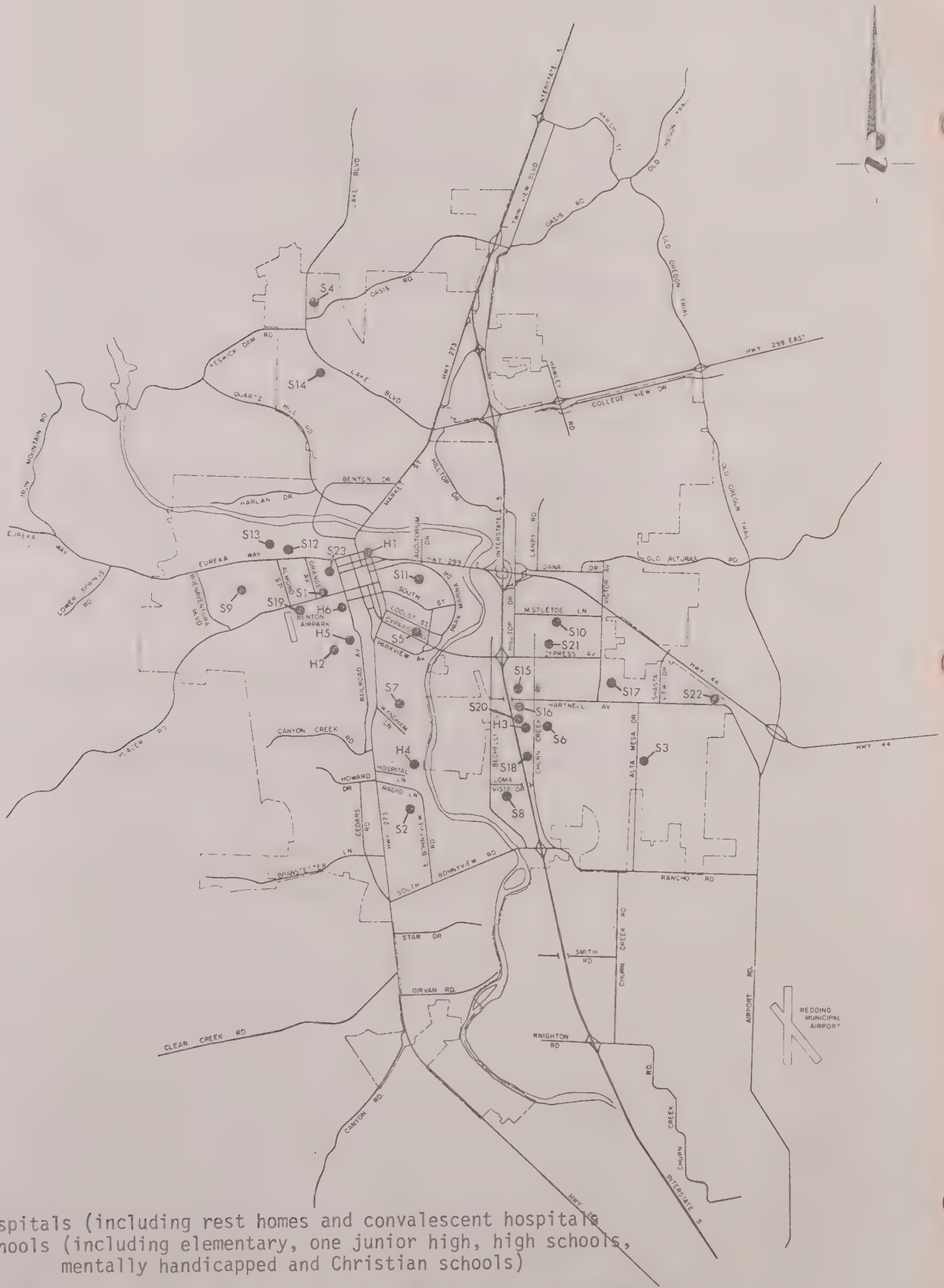
6. Estimation of Community Noise Exposure in Terms of Day-Night Average Level Noise Contours, Office of Noise Control, State of California, May, 1975.

7. Gatley, William S. and Frye, Edwin E., Regulation of Noise in Urban Areas, August, 1971.

8. Gay, Robert E., Community Noise Study, Inglewood, California, City of Inglewood Planning Department, August, 1972.

9. Kaiser, Edward J. et al., Promoting Environmental Quality Through Urban Planning and Controls. Chapel Hill, North Carolina, Center for Urban and Regional Studies, University of North Carolina, June, 1973.

10. League of CAlifornia Cities, Quiet City Committee, Quiet City Report. Los Angeles, California, League of California Cities.




SYMBOL

H - Hospitals (including rest homes and convalescent hospitals
S - Schools (including elementary, one junior high, high schools, mentally handicapped and Christian schools)

# NOISE SENSITIVE LANDUSE

APPENDIX C

QUESTIONNAIRE SURVEY RESULTS OF NOISE SENSITIVE USES
(IS YOUR INSTITUTION EXPERIENCING A NOISE PROBLEM?)

*SYMBOL

See Map Exhibit __, page __ for location of symbols.
H - Hospitals (inclucing rest homes and convalescent hospitals)
S - Schools (including elementary, one junior high, high schools, mentally handicapped and Christian schools)

| | INSTITUTION | *SYMBOL | RESPONSE |
|---|---|---|---|
| 1. | Memorial Hospital<br>1450 Liberty Street<br>Redding, California 96001 | H1 | No Response |
| 2. | Mercy Hospital<br>Clairmont Heights<br>Redding, California 96001 | H2 | No |
| 3. | Shasta Convalescent Hospital<br>3550 Churn Creek<br>Redding, California 96001 | H3 | No Response |
| 4. | Shasta General Hospital<br>P.O. Box 6050<br>Redding, California 96001 | H4 | No |
| 5. | Crestwood Convalescent<br>2490 Court Street<br>Redding, California | H5 | No |
| 6. | Beverly Manor<br>1830 Gold Street<br>Redding, California | H6 | No Response |
| 7. | Live Oak School<br>1644 Magnolia<br>Redding, California 96001 | S1 | No |
| 8. | Bonnyview Elementary<br>P. O. 2418<br>Redding, California 96099 | S2 | No |
| 9. | Alta Mesa Elementary<br>2301 Saturn Skyway<br>Redding, California 96002 | S3 | No Response |
| 10. | Buckeye Elementary<br>3707 Hiatt Drive<br>Redding, California 96003 | S4 | No Response |
| 11. | Cypress Elementary<br>901 W. Cypress<br>Redding, California 96001 | S5 | Yes |

| | INSTITUTION | *SYMBOL | RESPONSE |
|---|---|---|---|
| 12. | Enterprise High School<br>3411 Churn Creek Road<br>Redding, California 96002 | S6 | No |
| 13. | Juniper Elementary<br>3005 Anita<br>Redding, California 96001 | S7 | No |
| 14. | Lassen View Elementary<br>Loma Vista Drive<br>Redding, California 96001 | S8 | No |
| 15. | Manzanita Elementary<br>1240 Manzanita Hills Avenue<br>Redding, California 96001 | S9 | No |
| 16. | Mistletoe Elementary<br>1225 Mistletoe Lane<br>Redding, California 96002 | S10 | No |
| 17. | Sequoia Junior High<br>1805 Sequoia Street<br>Redding, California 96001 | S11 | No Response |
| 18. | Nova High School<br>2200 Eureka Way<br>Redding, California 96001 | S12 | No |
| 19. | Shasta High School<br>2500 Eureka Way<br>Redding, California 96001 | S13 | Yes |
| 20. | Buckeye Junior High<br>Tamarack Drive<br>Redding, California 96003 | S14 | No |
| 21. | Parsons Junior High<br>750 Hartnell Avenue<br>Redding, California 96002 | S15 | Yes |
| 22. | Rother Elementary<br>795 Hartnell Avenue<br>Redding, California 96002 | S16 | No Response |
| 23. | Shasta Meadows Elementary<br>2825 Yana Avenue<br>Redding, California 96002 | S17 | No |
| 24. | Grace Baptist Church & School<br>3782 Churn Creek Road<br>Redding, California 96002 | S18 | Yes |

| | INSTITUTION | *SYMBOL | RESPONSE |
|---|---|---|---|
| 25. | St. Joseph's Elementary<br>2460 Gold Street<br>Redding, California 96001 | S19 | No |
| 26. | Montevista Mentally Handicapped<br>3200 Adams Lane<br>Redding, California 96001 | S20 | Yes |
| 27. | Redding Seventh Day Adventist School<br>1356 East Cypress<br>Redding, California 96002 | S21 | No |
| 28. | North Valley Christian School<br>2960 Hartnell Avenue<br>Redding, California 96002 | S22 | No Response |
| 29. | Shasta County Library<br>1855 Shasta<br>Redding, California 96002 | | No Response |

TOTAL SURVEYED - 29

Yes - 5

No - 15

No Response - 9

TABLE 31

RECOMMENDED RESIDENTIAL BUILDING STANDARDS
FOR EXTERIOR TO INTERIOR NOISE REDUCTION
(Compiled by Redding Department of Planning and Community Development)

Source: Farm Home Administrative Noise Standards
United States Air Force Noise Standards
California Administrative Code Title 25 Noise Standards

| Criteria | 15 db | 20 db | 25 db | 30 db | 35 |
|---|---|---|---|---|---|
| I. GENERAL STANDARDS | | | | | |
| A. Brick veneer, masonry blocks or stucco exterior walls should be constructed airtight. All joints should be grouted or caulked airtight. | | | ● | ● | ● |
| B. At the penetration of exterior walls and ceiling by pipes, ducts, conduits, electrical or mechanical devices, the space between the wall or ceiling should be made airtight by caulking or filling with mortar. | | | ● | ● | ● |
| C. Window and/or through-the-wall ventilation units should not be used. | | ● | ● | ● | ● |
| D. Through-the-wall/door mail boxes should not be used | | | ● | ● | ● |
| E. Standard building construction practices pursuant to the uniform building code with some windows open (swamp coolers or exterior fans are satisfactory). | ● | | | | |
| F. Conventional construction standards of the uniform building code with windows closed and with forced ventilation or air conditioning. | | ● | | | |
| G. Operational vented fire places or wood stoves should not be used. | | | | ● | ● |
| H. All sleeping spaces should be provided with either a sound absorbing ceiling or a carpeted floor. | | | | ● | ● |
| I. No glass or plastic skylight should be used | | | | | ● |
| J. Only forced air or air conditioning should be used with all ducts caulked. | | ● | ● | ● | ● |
| K. California Administrative Code (Title 25) noise standards for new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings. | | ● | ● | ● | ● |
| 1. Wall and floor-ceiling assemblies separating dwelling units shall meet a Sound Transmission Class (STC) of 50 (45, if field tested), and an Impact Insulation Class (IIC) of 50 (45, if field tested). | Unless not required under Title 25 ● | ● | ● | ● | ● |
| 2. Entrance doors from interior corridors shall have an STC rating of not less than 30. | Unless not required under Title 25 ● | ● | ● | ● | ● |
| 3. Laboratory tests of walls and floor-ceiling designs having an STC and/or IIC of 50, may be used to establish an acceptable design. | Unless not required under Title 25 ● | ● | ● | ● | ● |

Note: Conventional dwelling construction with some windows open will produce a 15-20 db reduction of exterior to interior noise level.

TABLE 35

RECOMMENDED RESIDENTIAL BUILDING STANDARDS
FOR EXTERIOR TO INTERIOR NOISE REDUCTION

Source: Farm Home Administrative Noise Standards
United States Air Force Noise Standards
California Administrative Code Title 25 Noise Standards

| Criteria | 15 db | 20 db | 25 db | 30 db | 35 db |
|---|---|---|---|---|---|
| VII. FLOOR STANDARDS | | | | | |
| A. Openings to any crawl spaces below the floor of the lowest occupied rooms shall not exceed two percent of the floor area of the occupied rooms. | | | ● | | |
| B. The floors of the lowest occupied rooms shall be slab on fill or below grade. | | | | | ● |
| C. The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement. All door and window openings in the fully enclosed basement shall be tightly fitted. | | | | ● | |
| VIII. VENTILATION STANDARDS | | | | | |
| A. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors or other openings to the exterior. | | | ● | ● | ● |
| B. Gravity vent openings in attic shall not exceed code minimum in number and size. | | ● | ● | | |
| C. Gravity vent openings in attic shall not exceed code minimum in number and size. The openings shall be fitted with transfer ducts at least three feet in length containing internal sound absorbing duct lining. Each duct shall have a lined 90 degree bend in the duct such that there is no direct line of sight from the exterior through the duct into the attic. | | | | ● | ● |
| D. Gravity vent openings in attic shall not exceed code minimum in number and size. The openings shall be fitted with transfer ducts at least six feet in length containing internal sound absorbing duct lining. Each duct shall have a lined 90-degree bend in the duct such that there is no direct line of sight from the exterior through the duct into the attic. | | | | | ● |
| E. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20-gauge steel, which shall be lined with one-inch thick coated glass fiber, and shall be at least five-feet long with one 90-degree bend. | | | ● | ● | |
| F. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20-gauge steel, which shall be lined with 1-inch thick coated glass fiber, and shall be at least 10-feet long with one 90-degree bend. | | | | | ● |

TABLE 34

RECOMMENDED RESIDENTIAL BUILDING STANDARDS
FOR EXTERIOR TO INTERIOR NOISE REDUCTION

Source: Farm Home Administrative Noise Standards
United States Air Force Noise Standards
California Administrative Code Title 25 Noise Standards

| Criteria | 15 db | 20 db | 25 db | 30 db | 35 db |
|---|---|---|---|---|---|
| III. WINDOW STANDARDS | | | | | |
| A. Windows other than described in this section shall have a laboratory sound transmission class rating of at least: | | | | | |
| 1. Conventional window construction STC rating | ● | ● | | | |
| 2. STC - 22 | | | ● | | |
| 3. STC - 33 | | | | ● | |
| 4. STC - 38 | | | | | ● |
| B. Glass thickness shall be at least: | | | | | |
| 2. Double glazed at least 1/8-inch thick with a three-inch airspace separation. | | | | ● | |
| 3. Double glazed with fixed sash, at least 1/8-inch thick panes with three-inch airspace. | | | | | ● |
| C. All operable windows shall be weather stripped and airtight when closed so as to conform to an air-infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T. | | | ● | | |
| D. Double-glazed windows shall employ fixed sash or efficiently weather-stripped operable sash. The sash shall be rigid and weather stripped with material that is compressed airtight when the window is closed so as to conform to an infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T. | | | | ● | |
| E. Glass of windows shall be sealed in an airtight manner with a nonhardening sealant, or a soft elastomer gasket or glazing tape. | | | ● | ● | ● |
| F. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal Specification: TT-S-00227, TT-S-00230, or TT-S-00153. | | | ● | ● | ● |
| G. The total area of glass of both windows and exterior doors in sleeping spaces shall not exceed 20 percent of the floor area. | | | ● | ● | ● |

TABLE 37

RECOMMENDED RESIDENTIAL BUILDING STANDARDS
FOR EXTERIOR TO INTERIOR NOISE REDUCTION

Source: Farm Home Administrative Noise Standards
United States Air Force Noise Standards
California Administrative Code Title 25 Noise Standards

| Criteria | 15 db | 20 db | 25 db | 30 db | 35 db |
|---|---|---|---|---|---|
| IV. DOOR STANDARDS | | | | | |
| A. Doors, other than as described in this section, shall have a laboratory sound transmission class rating of at least: | | | | | |
| 1. Conventional Door Construction | ● | ● | | | |
| 2. STC 28 | | | ● | | |
| 3. STC 33 | | | | ● | |
| 4. STC 38 | | | | | ● |
| B. All exterior side-hinged doors should be solid-core wood or insulated hollow metal at least 1 3/4 inch thick and should be fully weather stripped. | | | ● | | |
| C. Double-door construction separated by minimum four-foot-wide vestibule door openings to the exterior. The door should be side-hinged and be solid-core wood or insulated hollow metal, at least 1 3/4-inch thick. Both doors should be tightly fitted and weather stripped. | | | | ● | ● |
| D. Exterior sliding doors shall be weather stripped with an efficient airtight gasket system with performance as specified in Section III - C. The glass in the sliding doors shall be at least 3/16-inch thick. | | | ● | | |
| E. Glass in doors shall be sealed in an airthight nongardening sealant, or in a soft elastomer gasket or glazing tape. | | | ● | ● | Glass doors not recommended |
| F. The perimeter of door frames shall be sealed airtight to the exterior wall construction as described below: | | | | | |
| 1. Section III - F | | | ● | | |
| 2. Section III - D | | | | ● | ● |
| G. The glass or double-glazed sliding doors shall be separated by a minimum "4" airspace. Each sliding frame shall be provided with an efficiently airtight weather stripping material as specified in Section III - D. | | | | ● | Glass doors not recommended Sec. IV - |

TABLE 36

RECOMMENDED RESIDENTIAL BUILDING STANDARDS
FOR EXTERIOR TO INTERIOR NOISE REDUCTION

Source: Farm Home Administrative Noise Standards
United States Air Force Noise Standards
California Administrative Code Title 25 Noise Standards

| Criteria | 15 db | 20 db | 25 db | 30 db | 35 db |
|---|---|---|---|---|---|
| V. ROOF STANDARDS | | | | | |
| A. Combined roof and ceiling construction other than described in this section and Section VI shall have a laboratoratory sound transmission class rating as follows: | | | | | |
| 1. STC - 39 | | | ● | | |
| 2. STC - 44 | | | | ● | |
| 3. STC - 49 | | | | | ● |
| B. Conventional roof construction with the exception that clay tile roofs should have continuous 5/8-inch plywood sheathing underneath tile roofs. | ● | ● | | | |
| C. With an attic or rafter space at least six-inch deep, and with a ceiling below the roof sheathing shall consist of one-inch x solid, or one-half inch plywood, topped by roofing as required. The plywood shall be spaced as per code. | | | ● | ● | ● |
| D. If the underside of the roof is exposed, or if the attic or rafter depth is less than six inches, the roof construction shall have a surface weight of at least 25 pounds per square foot. Rafters, joists or other framing may not be included in the surface weight calculation. | | | | | |
| 1. At least 25 pounds per square feet. | | | ● | | |
| 2. At least 40 pounds per square feet. | | | | ● | |
| 3. At least 75 pounds per square feet. | | | | | ● |
| E. Window or dome skylights should have a laboratory sound transmission class rating of at least: | | | | | |
| 1. STC - 28 | | | ● | | |
| 2. STC - 33 | | | | ● | |
| 3. STC - 49 | | | | | ● |
| VI. CEILING STANDARDS | | | | | |
| A. Gypsum board or plaster ceilings at least one-half inch thick shall be provided where required by Section V - E. Ceilings shall be substantially airtight, with a minimum number of penetrations. All penetrations shall be caulked. | | | ● | ● | |
| C. Gypsum board or plaster ceilings at least one-half inch thick shall be provided where required by Section V - E. Ceilings shall be substantially airtight, with a minimum number of penetrations. The ceiling panels shall be mounted on resilient clips or channels. A nonhardening sealant shall be used to seal gaps between the ceiling and walls around the ceiling perimeter.<br><br>Valted ceiling with less than 12 inches of dead air space is not recommended. | ● | ● | | | ● |

TABLE 6
EXISTING AND PROJECTED NOISE LEVELS (1980 - 2000) FOR HIGHWAYS
(Source: California Department of Transportation)

| EXISTING (1980) | | | | | | | | | PROJECTED (2000) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CONTOUR INTERVAL IN CNEL | | | | | | CONTOUR INTERVAL IN CNEL | | | | |
| HIGHWAY | SPEED | ADT | PERCENT TRUCK VOLUME | CNEL @ 100' | 70 | 65 | 60 | 55 | ESTIMATED ADT | CNEL @ 100' | 70 | 65 | 60 | 55 | NOISE LEVEL CHANGES FROM 1980 to 2000 |
| **State Route 299 East & Eureka Way** | | | | | | | | | | | | | | | |
| Old Shasta to Redding City Limits. | 55 | 6,000 | 6.0 | 67 | 50' | 150' | 370' | 800' | 12,000 | 70 | 100' | 270' | 600' | 1,300' | + 3 db(A) |
| Buenaventura Boulevard to Orange Avenue. | | 17,500 | 4.5 | 67 | 50' | 150' | 370' | 800' | 28,000 | 69 | 80' | 230' | 500' | 1,100' | + 2 db(A) |
| I-5 to Hawley Road | 55 | 8,000 | 3.5 | 67 | 50' | 150' | 370' | 800' | 44,000 | 73 | 200' | 410' | 900' | 2,000' | + 6 db(A) |
| Hawley Road to Old Oregon Trail. | 55 | 6,700 | 3.5 | 67 | 50' | 150' | 370' | 800' | 36,000 | 73 | 200' | 410' | 410' | 2,000' | + 6 db(A) |
| **State Route 44** | | | | | | | | | | | | | | | |
| Victor Avenue to Old Oregon Trail. | 55 | 13,000 | 2.3 | 64 | 25' | 80' | 240' | 500' | 29,000 | 67 | 50' | 150' | 370' | 800' | + 3 db(A) |
| Canby Road to Victor Avenue. | 55 | 14,000 | 2.3 | 64 | 25' | 80' | 240' | 500' | 30,000 | 67 | 50' | 150' | 370' | 800' | + 3 db(A) |
| **State Route 273 (Market Street)** | | | | | | | | | | | | | | | |
| Eureka Way to Anderson City Limits. | 55 | 21,300 | 7.6 | 71 | 125' | 325' | 680' | 1,500 | 45,000 | 74 | 230' | 500' | 1100' | 2,400' | + 3 db(A) |
| Eureka Way to Benton Drive. | 35 - 45 | 26,000 | 2.3 | 71 | 125' | 325' | 680' | 1,500 | 41,000 | 73 | 200' | 410' | 900' | 2,000' | + 2 db(A) |
| **Interstate 5** | | | | | | | | | | | | | | | |
| Through Redding | 55 | 16,700 to 21,700 | 16.0 | 75 | 240' | 520' | 1120' | 2,000 | 27,000 to 54,000 | 78 | 420' | 980' | 2000' | 2,500' | + 3 db(A) |

TABLE 38

| Criteria | 15 db | 20 db | 25 db | 30 db | 35 db |
|---|---|---|---|---|---|
| VIII. VENTILATION STANDARDS (Continued) | | | | | |
| G. Duct lining shall be coated glass fiber duct liner at least one-inch thick. | | | ● | ● | ● |
| H. All vent ducts connecting the interior space to the outdoors, excepting domestic range exhaust ducts, shall contain at least a five-foot length of internal sound absorbing duct lining. Each duct shall be provided with a bend in the duct such that there is no direct line of sight through the duct from the venting cross section to the room-opening cross section. | | | ● | | |
| I. All vent ducts connecting the interior space to the outdoors, excepting domestic range exhaust ducts, shall contain at least a 10-foot length of internal sound absorbing duct lining. Each duct shall be provided with a lined 90-degree bend in the duct such that there is no direct line of sight through the duct from the venting cross section to the room opening cross section. | | | | ● | ● |
| J. Building heating units with flues or combustion air vents shall be located in a closet or room closed off from the occupied space by doors. | | | | ● | ● |
| K. Doors between occupied space and mechanical equipment areas shall be solid-core wood or 20-gauge steel hollow metal at least 1 3/4 inch thick and shall be fully weather stripped. | | | | ● | ● |
| L. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a baffle plate across the exterior termination which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line of sight into the vent duct. The baffle plate shall be of the same material and thickness as the vent duct material. | | | ● | ● | ● |
| M. Fireplaces shall be provided with well-fitted dampers. | | | ● | | |

TABLE 8
EXISTING AND PROJECTED NOISE LEVELS (1980 - 2000) FOR MAJOR STREETS

| EXISTING (1980) | | | | | | | | | | PROJECTED (2000) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAJOR STREET | NOISE MONITORING STATION | SPEED | ADT | PERCENT TRUCK VOLUME | CNEL @ 100' | CONTOUR INTERVAL IN CNEL | | | | ESTIMATED ADT | CNEL @ 100' | CONTOUR INTERVAL IN CNEL | | | | NOISE LEVEL CHANGES FROM 1980 to 2000 |
| | | | | | | 70 | 65 | 60 | 55 | | | 70 | 65 | 60 | 55 | |
| **Cedars Road** | | | | | | | | | | | | | | | | |
| Howard Drive to South Bonnyview Road. | 30 | 40 | 1,200 | 2 | 49.2 | 0 | 0 | 0 | 30' | 7,000 to 10,000 | 61 | 0 | 40' | 120' | 300' | + 11 db(A) |
| **Cypress Avenue** | | | | | | | | | | | | | | | | |
| Market Street to Sacramento River | 10 & 11 | 35 | 23,800 | 3 | 69.0 | 80' | 230' | 500' | 1,100' | 34,000 | 70 | 100' | 270' | 580' | 1,300' | + 1 db(A) |
| Churn Creek Road to Victor Avenue | 27 | 40 | 5,200 | 3 | 60.5 | 0 | 25' | 100' | 300' | 20,000 | 66 | 25' | 120' | 300' | 700' | + 6 db(A) |
| **South Bonnyview Road** | | | | | | | | | | | | | | | | |
| Sacramento River | 2 | 45 | 12,200 | 4 | 63.6 | 20' | 40' | 210 | 420 | 41,000' | 67.6 | 50' | 170' | 400' | 900' | + 4 db(A) |
| **Rancho Road** | | | | | | | | | | | | | | | | |
| Churn Creek Road to Alta Mesa | 21 | 40 | 5,000 | 2 | 61.0 | 0 | 40' | 120' | 230' | 15,000 | 65 | 0 | 100' | 270' | 600' | + 4 db(A) |
| Alta Mesa to Airport Road. | 21 | 40 | 2,600 | | 60.0 | 0 | 30' | 100' | 270' | 12,000 | 63 | 20' | 40' | 210' | 420' | + 3 db(A) |

TABLE 7
EXISTING AND PROJECTED NOISE LEVELS (1980 - 2000) FOR MAJOR STREETS

| MAJOR STREET | EXISTING (1980) NOISE MONITORING STATION | SPEED | ADT | PERCENT TRUCK VOLUME | CNEL @ 100' | CONTOUR INTERVAL IN CNEL 70 | 65 | 60 | 55 | PROJECTED (2000) ESTIMATED ADT | CNEL @ 100' | CONTOUR INTERVAL IN CNEL 70 | 65 | 60 | 55 | NOISE LEVEL CHANGES FROM 1980 to 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hartnell Avenue** | | | | | | | | | | | | | | | | |
| Churn Creek Road to Victor Avenue. | 23 | 40 | 7,000 to 15,200 | 2 | 61.6 to 65.0 | 35' | 100' | 270' | 600' | 25,000 | 67 | 50' | 170' | 400' | 900' | + 2db(A) |
| Victor Avenue to Argyle Road. | 29 | 50 | 6,000 | 2 | 63.0 | | | | | 9,000 | 65 | 0 | 100' | 270' | 600' | + 2db(A) |
| **Bechelli Lane** | | | | | | | | | | | | | | | | |
| Cypress Avenue to Hartnell Avenue. | 12 | 40 | 18,300 | 2 | 61.0 | 0 | 40' | 120' | 300' | 40,000 | 66 | 25' | 120' | 300' | 700' | + 5db(A) |
| Hartnell Avenue to Loma Vista Drive | 22 | 40 | 10,000 | 2 | 59.0 | 0 | 30' | 100' | 260' | 30,000 | 65 | 0 | 100' | 270' | 600' | + 6db(A) |
| **Churn Creek Road** | | | | | | | | | | | | | | | | |
| Highway 44 to Cypress Avenue. | 25 | 40 | 4,000 | 2 | 64.0 | 25' | 80' | 230 | 500' | 31,000 | 70 | 100' | 270' | 600' | 1,300' | + 6db(A) |
| Cypress Avenue to Loma Vista Drive. | 25 | 40 | 12,700 | 2 | 64.0 | 25' | 80' | 230 | 500' | 25,000 | 70 | 100' | 270' | 600' | 1,300' | + 6db(A) |
| Loma Vista Drive to Rancho Road. | 26 | 50 | 4,800 | 2 | 61.0 | 0 | 40' | 120 | 300' | 15,000 | 63 | 11' | 60' | 200' | 410' | + 2db(A) |
| **Placer Street** | | | | | | | | | | | | | | | | |
| Court Street to Almond Street. | 3 | 35 | 10,800 | 2 | 64.1 | 25' | 80' | 230' | 500' | 20,000 | 67 | 50' | 150' | 270' | 800' | + 3db(A) |
| Almond Street to Buenaventura Boulevard. | 7 | 35 | 6,200 | 2 | 60.9 | 0 | 40' | 120' | 230' | 20,000 | 65 | 0 | 100' | 270' | 600' | + 5db(A) |
| Buenaventura Boulevard to City Limit. | 7 | 40 | 4,200 | 2 | 61.1 | 0 | 40' | 120' | 230' | 13,000 | 63 | 11 | 60' | 200' | 410' | + 2db(A) |

TABLE 10
EXISTING AND PROJECTED NOISE LEVELS (1980 - 2000) FOR MAJOR STREETS

| EXISTING (1980) | | | | | | | | | | PROJECTED (2000) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAJOR STREET | NOISE MONITORING STATION | SPEED | ADT | PERCENT TRUCK VOLUME | CNEL @ 100' | CONTOUR INTERVAL IN CNEL | | | | ESTIMATED ADT | CNEL @ 100' | CONTOUR INTERVAL IN CNEL | | | | NOISE LEVEL CHANGES FROM 1980 to 2000 |
| | | | | | | 70 | 65 | 60 | 55 | | | 70 | 65 | 60 | 55 | |
| | 1 | | | | | | | | | | | | | | | |
| Dana Drive | | | | | | | | | | | | | | | | |
| Canby Road to Victor Avenue. | 6 | 40 | 4,500 | 59.7 | 59.7 | 0 | 30' | 100' | 270' | 14,500 | 63 | 20' | 40' | 210' | 420' | + 3db(A) |
| Tehama Street | | | | | | | | | | | | | | | | |
| North Market Street to Highway 44. (Adjacent to Memorial Hospital) | 8 | 35 | 11,400 | 3 | 61.3 | 0 | 40' | 110' | 320' | 17,000 | 65 | 0 | 100' | 270' | 600' | + 4db(A) |
| Yuba Street | | | | | | | | | | | | | | | | |
| Post Office and Downtown Mall. (Train Noise Not Included) | 9 | 35 | --- | N/A | 60.6 | 0 | 25' | 100' | 300' | N/A | 62 | 10' | 50' | 150' | 350' | + 1db(A) |

TABLE 9
EXISTING AND PROJECTED NOISE LEVELS (1980 - 2000) FOR MAJOR STREETS

| MAJOR STREET | EXISTING (1980) NOISE MONITORING STATION | SPEED | ADT | PERCENT TRUCK VOLUME | CNEL @ 100' | CONTOUR INTERVAL IN CNEL 70 | 65 | 60 | 55 | PROJECTED (2000) ESTIMATED ADT | CNEL @ 100' | CONTOUR INTERVAL IN CNEL 70 | 65 | 60 | 55 | NOISE LEVEL CHANGES FROM 1980 to 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hilltop Drive** | | | | | | | | | | | | | | | | |
| Lake Boulevard East to I-5. | 31 | 35 | 7,000 | 2 | 60 | 0 | 30' | 100' | 270' | 32,000 | 66.0 | 25' | 120' | 300' | 700' | + 6db(A) |
| I-5 to Cypress Avenue | 13 | 35 | 13,000 to 19,000 | 4 | 66.3 | 25' | 120' | 300' | 700' | 29,000 to 47,000 | 70.0 | 100' | 270' | 580' | 1,300' | + 4db(A) |
| **Parkview Avenue** | | | | | | | | | | | | | | | | |
| Market Street to Park Marina Drive. | 14 | 35 | 2,700 | 2 | 59.7 | 0 | 30' | 100' | 270' | 9,000 | 62.0 | 10' | 50' | 150' | 350' | + 2db(A) |
| **Park Marina Drive** | | | | | | | | | | | | | | | | |
| Highway 299 East to Cypress Avenue. | 15 | 35 | 4,000 | 2 | 59.6 | 0 | 30' | 100' | 260' | 8,000 | 62.0 | 10' | 50' | 150' | 350' | + 2db(A) |
| **Oasis Road** | | | | | | | | | | | | | | | | |
| I-5 to Oasis Road | 20 | 45 | 1,600 | 6 | 58.4 | 0 | 20' | 65' | 200' | 10,000 (future noise due to Industrial Park and railroad activities) | 65.4 | 35' | 100' | 270' | 600' | + 7db(A) |

PROJECTED NOISE LEVELS
FOR UNDEVELOPED MAJOR STREET LINKS
(YEAR 2000)

| ESTIMATED NOISE DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| HIGHWAY | SPEED | ADT | PERCENT TRUCK VOLUME | CNEL @ 100' | CONTOUR INTERVAL IN CNEL | | | |
| | | | | | 70 | 65 | 60 | 55 |
| **SHASTA VIEW DRIVE** | | | | | | | | |
| Oasis Road to Hwy 299 E. | 40 | 5,000-10,000 | 2 | 62 | 11' | 50' | 150' | 350' |
| Hwy 299 E. to Hwy 44 | 40 | 6,000-13,000 | 2 | 64 | 25' | 80' | 230' | 500' |
| Hartnell Avenue to Airport Road | 40 | 11,000-15,000 | 2 | 64 | 25' | 80' | 230' | 500' |
| **CHURN CREEK ROAD** | | | | | | | | |
| Hwy 299 E. to Hwy 44 | 40 | 20,000-28,000 | 3 | 65 | 30' | 100' | 270' | 600' |
| **KNIGHTON ROAD** | | | | | | | | |
| Interstate 5 to Airport Road | 40 | 17,000 | 5 | 65 | 30' | 100' | 270' | 600' |
| **AIRPORT ROAD BYPASS** | | | | | | | | |
| Meadow View Drive to Riverside Avenue | 45 | 17,000 | 5 | 65 | 30' | 100' | 270' | 600' |
| **CREEKSIDE DRIVE** | | | | | | | | |
| So. Bonnyview to Girvan Road | 35 | 21,000 | 1 | 64 | 25' | 80' | 230' | 500' |
| **HARTNELL AVENUE** (DEVELOPED) | | | | | | | | |
| Bechelli Lane to Cypress Avenue | 35 | 25,000 | 5-10 | 70 | 100' | 270' | 600' | 1300' |
| **S. BUENAVENTURA BOULEVARD** | | | | | | | | |
| Placer Street to Railroad Avenue | 35 | 11,000-13,800 | 4-6 | 62 | 11' | 50' | 150' | 350' |
| **RIO DRIVE** | | | | | | | | |
| Market Street to Hilltop Drive | 35 | 8,000-12,000 | 1-2 | 62 | 11' | 50' | 150' | 350' |

TABLE 11
EXISTING AND PROJECTED NOISE LEVELS (1980 - 2000) FOR MAJOR STREETS

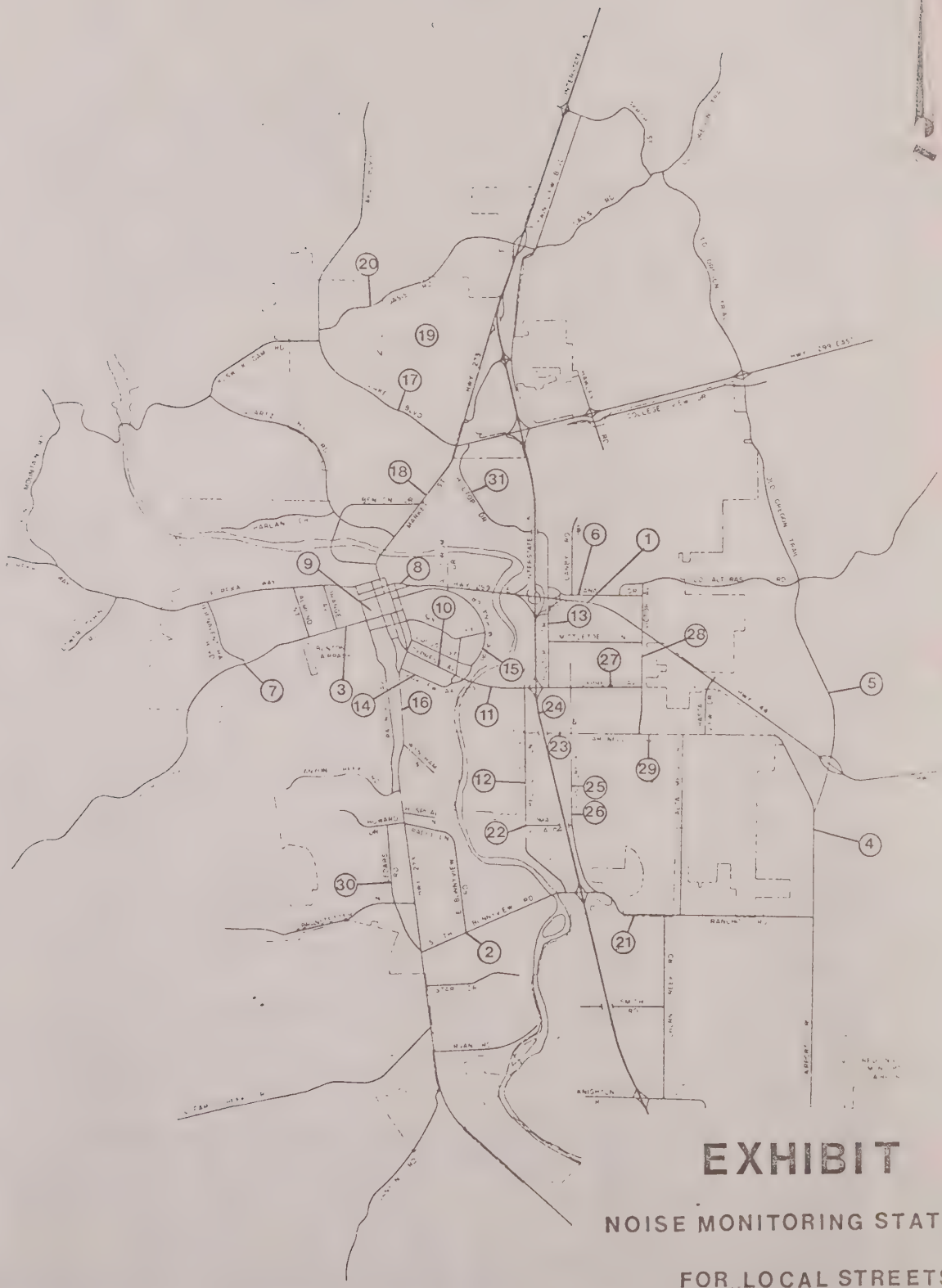
| MAJOR STREET | NOISE MONITORING STATION | SPEED | ADT | PERCENT TRUCK VOLUME | CNEL @ 100' | CONTOUR INTERVAL IN CNEL 70 | 65 | 60 | 55 | ESTIMATED ADT | CNEL @ 100' | CONTOUR INTERVAL IN CNEL 70 | 65 | 60 | 55 | NOISE LEVEL CHANGES FROM 1980 to 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | EXISTING (1980) | | | | | | | | PROJECTED (2000) | | | | | |
| **Victor Avenue** | | | | | | | | | | | | | | | | |
| Hartnell Avenue to Mistletoe Lane | 28 | 35 | 7,600 | 2 | 60 | 0 | 30' | 100' | 270' | 9,600 | 61 | 0 | 40' | 120' | 230' | + 1db(A) |
| Highway 44 to Old Alturas Road | 28 | 35 | 6,000 | 2 | 59 | 0 | 20' | 65' | 200' | 12,000 | 62 | 10' | 50' | 150' | 350' | + 3db(A) |
| **Airport Road** | | | | | | | | | | | | | | | | |
| Argyle Road to Meadow View Road | 4 | 50 | 5,000 | 2 | 58.7 | 0 | 20' | 65' | 200' | 27,400 | 66 | 25' | 120' | 300' | 700' | + 7db(A) |
| **Old Oregon Trail** | | | | | | | | | | | | | | | | |
| Highway 44 to Highway 299 East (Background Noise from Crickets) | 5 | 40 | 2,000 | 2 | 57 | 0 | 11' | 50' | 150' | 11,000 to 15,000 | 62 | 10' | 50' | 150' | 350' | + 5 db(A) |
| **Lake Boulevard** | | | | | | | | | | | | | | | | |
| Route 273 to Clay Street | 17 | 45 | 15,000 | 2 | 65.7 | 40 | 110' | 300' | 650' | 42,000 | 70 | 100' | 270' | 580' | 1,300' | + 4 db(A) |
| Clay Street to Tamarack Drive. | 17 | 50 | 12,900 | 2 | 65.0 | 30' | 100' | 270' | 580' | 36,000 | 69 | 80' | 280' | 500' | 1,100' | + 4 db(A) |
| Tamarack Drive to Oasis Road. | 17 | 50 | 8,000 | 2 | 62.0 | 11' | 50' | 150' | 350' | 22,000 | 66 | 25' | 120' | 300' | 700' | + 4 db(A) |

TABLE 13
NOISE MONITORING DATA

| STREET | STATION 1 | DATE 7/20/82 | DAYTIME(10:30) | | NIGHTTIME(12:00) | | |
|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Hwy 44 | 100' from outer lane N/O Hwy 44 and S/O Canby Road an Dana Road Intersection 1. | 62.5 | 67 | 25 | 58 | 65 | 7 |
| | 2. | 57.5 | -- | 17 | 57 | 68 | 7 |
| | 3. | 58 | 67.5 | 13 | 54 | 77 | 3 |
| | 4. | 62 | -- | 21 | | | |
| | 5. | 61 | 73 | 26 | 54 | | 3 |
| | AVERAGE 60 SEC. LEQ. | 60.5 | | | 56.0 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 63.4 | | |

| STREET | STATION 2 | DATE 7/20/82 | DAYTIME( 2:00) | | NIGHTTIME( 10:20) | | |
|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| South Bonneyview Road | Calvery Church parking lot 1/2 mile E/O Eastside Road 1. | 57.5 | 84.5 | 8 | 55 | 76 | 3 |
| | 2. | 54.5 | 89.0 | 5 | 55 | 75 | 4 |
| | 3. | 60.0 | 81 | 12 | 57 | 78 | 3 |
| | 4. | 65.5 | 80 | 15 | 57 | 80 | 4 |
| | AVERAGE 60 SEC. LEQ. | 61 | | | 56 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 63.6 | | |

| STREET | STATION 3 | DATE 7/20/82 | DAYTIME( 2.30) | | NIGHTTIME(10.00) | | |
|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Placer Street | Willis Street (No traffic on Willis) 1. | 65 | 76 | 15 | 56.5 | | 6 |
| | 2. | 62 | 84 | 15 | 59.0 | 77 | 6 |
| | 3. | 59 | 80 | 12 | 50.0 | 77 | 0 |
| | 4. | 64 | 73 | 12 | 57.0 | | 2 |
| | AVERAGE 60 SEC. LEQ. | 61.5 | | | 56.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 64.0 | | |




# EXHIBIT

NOISE MONITORING STATIONS

FOR LOCAL STREETS

AUGUST 2, 1982

*note:* NOISE MONITORING FOR HIGHWAYS SUPPLIED BY CALTRANS.

TABLE 15
NOISE MONITORING DATA

| STREET | STATION 7 | DATE 7/21/82 | DAYTIME( 10:00) | | NIGHTTIME( 10:30 ) | | |
|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Placer St. | On Bueaventura (No traffic on Bueaventura) 1. | 59 | 80 | 11 | 37 | 75 | 0 |
| | 2. | 59 | 81 | 15 | 46 | 78 | 1 |
| | 3. | 59 | 81 | 10 | | | |
| | 4. | 65.5 | 76 | 12 | 55 | 77 | 4 |
| | AVERAGE 60 SEC. LEQ. | 61.5 | | | 49.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 60.85 | | |

| STREET | STATION 8 | DATE 7/21/82 | DAYTIME( ) | | NIGHTTIME(10:37 ) | | |
|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Tehama St. | N/S of Memorial Hospital parking lot 100' from Tehama St. & 300' from East St. 1. | 58.5 | 78 | 18 | 57.5 | 61 | 7 |
| | 2. | 60 | 78 | 10 | 51 | 70 | 0 |
| | 3. | 56 | 78 | 15 | 51.5 | 69 | 1 |
| | 4. | 58 | 75 | 18 | 50 | 68 | 0 |
| | AVERAGE 60 SEC. LEQ. | 58 | | | 54 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 61.3 | | |

| STREET | STATION 9 | DATE 7/26/82 | DAYTIME( ) | | NIGHTTIME( 10:00) | | |
|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Yuba St. | 100' from southern pacific RR tracks (No train) 36 cars/4 min on Calif St. 1. | 58 | 78 | 10 | 50 | 61 | 7 |
| | 2. | 60 | 75 | 14 | 53 | 62 | 5 |
| | 3. | 58 | 75 | 14 | 51 | 64 | 6 |
| | 4. | 57 | 82 | 12 | 57 | 74 | 7 |
| | AVERAGE 60 SEC. LEQ. | 58 | | | 53 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 60.6 | | |

TABLE 14
NOISE MONITORING DATA

| STREET | STATION 4 | 7/20/82 DATE | DAYTIME(10:20) | | NIGHTTIME( ) | | |
|---|---|---|---|---|---|---|---|
| Airport Rd | 1/2 mile south of Hwy 44 100' from edge of outer Lane | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 54 | 90 | 7 | 51 | 77 | 1 |
| | 2. | 54 | 72 | 6 | 49 | 77 | 1 |
| | 3. | 55 | 78.2 | 5 | 53 | 79 | 2 |
| | 4. | 50 | 78.2 | 2 | 53 | 77 | 2 |
| | AVERAGE 60 SEC. LEQ. | 53.5 | | | 52 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 58.7 | | |

| STREET | STATION 5 | DATE | DAYTIME( ) | | NIGHTTIME( ) | | |
|---|---|---|---|---|---|---|---|
| Old Oregon Trail | 1/2 mile N/O Hwy 44 | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 52.0 | 74 | 5 | 53 | 77 | 1 |
| | 2. | 52.5 | | 3 | 49 | 79 | 3 |
| | 3. | 57.5 | | 6 | 51 | 70 | 2 |
| | 4. | 50.0 | | 1 | 50 | 78 | 1 |
| | AVERAGE 60 SEC. LEQ. | 54.0 | | | 51 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | | |

| STREET | STATION 6 | DATE | DAYTIME( ) | | NIGHTTIME( ) | | |
|---|---|---|---|---|---|---|---|
| Dana Dr | 200' E/O Canby Rd. & 100' N/O Dana Dr. Note: Hwy 44 is 900' away & has not significant effect on property | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 52 | | 2 | 57.5 | 85 | 0 |
| | 2. | 52.5 | 63.5 | 4 | 56.0 | 67 | 3 |
| | 3. | 52.5 | | 5 | 51 | 80 | 0 |
| | 4. | 0 | | 0 | | | |
| | AVERAGE 60 SEC. LEQ. | 52 | | | 53.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 59.7 | | |

TABLE 17
NOISE MONITORING DATA

| STREET | STATION 13 | 7/21/82 DATE | DAYTIME(3:30 ) | | NIGHTTIME( 12:10) AM | | |
|---|---|---|---|---|---|---|---|
| Hilltop Dr. | Holiday Inn parking lot 1000' N/O Mistletoe Ln. | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 63 | 80 | 24 | 57.5 | 77 | 4 |
| | 2. | 62.5 | 82 | 31 | 60 | 77 | 4 |
| | 3. | 63.0 | 84 | 28 | 57.5 | 78 | 5 |
| | 4. | ___ | ___ | | 60 | 77 | |
| | AVERAGE 60 SEC. LEQ. | 63 | | | 59 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 66.3 | | |

| STREET | STATION 14 | DATE | DAYTIME( 3:20) | | NIGHTTIME( ) | | |
|---|---|---|---|---|---|---|---|
| Parkview Ave. | City Hall | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 57 | 60 | 5 | 53 | 63 | 1 |
| | 2. | 56 | 70 | 10 | 52 | 64 | 2 |
| | 3. | 50 | 68 | 3 | 55 | 74 | 1 |
| | 4. | 59.5 | 82 | | 54 | 74 | |
| | AVERAGE 60 SEC. LEQ. | 54.5 | | | 53.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 59.7 | | |

| STREET | STATION 15 | 7/20/82 DATE | DAYTIME( 3;40 ) | | NIGHTTIME( 11;10 ) | | |
|---|---|---|---|---|---|---|---|
| Park Marina Dr. | 100' W/O Olympus | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 60 | 79 | 15 | 48 | 62 | 0 |
| | 2. | 56 | 78 | 10 | 51.5 | 70 | 1 |
| | 3. | 58.5 | 75 | | 52 | | 2 |
| | 4. | | | | 52 | | 2 |
| | AVERAGE 60 SEC. LEQ. | 58.5 | | | 51 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 59.6 | | |

TABLE 16
NOISE MONITORING DATA

| STREET | STATION 10 | DATE 7/19/82 | DAYTIME( 9 am) | | | NIGHTTIME(11:30 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Cypress Ave. | N/E C/O of Akard Ave. & Cypress Ave. | | | | | | |
| | 1. | 65 | | 36 | 59 | 84 | 7 |
| | 2. | 64 | 80 | 18 | 59 | 79 | 4 |
| | 3. | 63 | | 23 | 64 | 70 | |
| | 4. | 64 | | 30 | 64 | | 4 |
| | AVERAGE 60 SEC. LEQ. | 64 | | | | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 68.8 | | |

| STREET | STATION 11 | DATE 7/19/82 | DAYTIME( 9:20) | | | NIGHTTIME( ) | | |
|---|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Cypress Ave. | S/W C/O Bechelli Lane | | | | | | |
| | 1. | 61.5 | | 29 | | | |
| | 2. | | | | | | |
| | 3. | | | | | | |
| | 4. | | | | | | |
| | AVERAGE 60 SEC. LEQ. | 61.5 | | | | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | | |

| STREET | STATION 12 | DATE 7/14/82 | DAYTIME( 9:20 ) | | | NIGHTTIME( 1135 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Bechelli Ln. | Riverview Market parking lot | | | | | | |
| | 1. | 58 | 8 | | 50 | | 1 |
| | 2. | 58 | 9 | | 49 | 65 | 1 |
| | 3. | 57.5 | 8 | | 46 | | 0 |
| | 4. | | | | 51 | | 2 |
| | AVERAGE 60 SEC. LEQ. | 57.5 | | | 49.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 58.4 | | |

TABLE 19
NOISE MONITORING DATA

| STREET | STATION 19 | | DATE 7/28/82 | DAYTIME( 9:37) | | NIGHTTIME(12:00 )a.m. | | |
|---|---|---|---|---|---|---|---|---|
| | | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Redwood Mobilehome Subdivision on Eagle Nest Court | At 2018 Eagle Nest accross from Master Fabricators 100' From Earth Berm could hear grinder | 1. | 50 | 64.5 bird | 0 | 38.5 | 57 | 0 |
| | | 2. | 43 | 66 | 1 | 34 | 55 | 0 |
| | | 3. | 42 | 60 bird | 0 | 39 | 57 | 0 |
| | | 4. | 48.5 | 64 bird | 0 | | | |
| | AVERAGE 60 SEC. LEQ. | | 47 | | | 38.8 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 47.8 | | |

| STREET | STATION 20 | | DATE 7/27/82 | DAYTIME( 9:50) | | NIGHTTIME(12:20 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Oasis Road | Woggan Lane near Redding Tank (Could hear shear press) | 1. | 54 | 72 car | 4 | 45 | 54 | 1 |
| | | 2. | 60 | 75 car | 4 | 45 | 63 | |
| | | 3. | 53 | 53 press | 4 | 45 | 71 | 0 |
| | | 4. | 50 | 50 press | 1 | 57 | 57 | 0 |
| | AVERAGE 60 SEC. LEQ. | | 58.3 | | | 52 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 60 | | |

| STREET | STATION 21 | | DATE 7/2/81 | DAYTIME( 8:40) | | NIGHTTIME(10:00 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Rancho Road | N/E 40 of Rancho Road and Victor Avenue | 1. | | | | | | |
| | | 2. | | | | | | |
| | | 3. | | | | | | |
| | | 4. | | | | | | |
| | AVERAGE 60 SEC. LEQ. | | 61.5 | | | 44.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 60.9 | | |

TABLE 18
NOISE MONITORING DATA

| STREET | STATION 16 | DATE 7/19/82 | DAYTIME( 4:05) | | | NIGHTTIME(10:57 ) | | |
|---|---|---|---|---|---|---|---|---|
| Market Street | Across from Soence Street | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | | 1. | 71 | 83 | 29 | 58 | 79 | 8 |
| | | 2. | 68 | 87 | 27 | 62.5 | | 7 |
| | | 3. | 65.5 | 83 | 23 | 62.0 | 80 | 8 |
| | | 4. | 68.5 | 90 | 28 | 60 | 78 | 4 |
| | AVERAGE 60 SEC. LEQ. | | 68.5 | | | 61 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 69.6 | | |

| STREET | STATION 17 | DATE 7/26/82 | DAYTIME( 7:35) | | | NIGHTTIME(10:00 ) | | |
|---|---|---|---|---|---|---|---|---|
| Lake Boulevard | Clay Street | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | | 1. | 63.5 | 83.5 | 14 | 53 | 70 | 1 |
| | | 2. | 65 | 80 | 17 | 58 | 77 | 12 |
| | | 3. | 63.5 | 84 | 9 | 59 | 83 | 9 |
| | | 4. | 63 | 81 | 10 | | | |
| | AVERAGE 60 SEC. LEQ. | | 64 | | | 57.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 65.7 | | |

| STREET | STATION 18 | DATE 7/26/82 | DAYTIME( 8:07 ) | | | NIGHTTIME( ) | | |
|---|---|---|---|---|---|---|---|---|
| North Market Street | Accross from Littrell Welding between Benton Drive and Rio Drive | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | | 1. | 68 | 85 | 13 | 60 | 83 | 8 |
| | | 2. | 71 | 86 | 21 | 62 | 76 | 17 |
| | | 3. | 70.5 | 85 | 21 | 62.5 | 70 | 15 |
| | | 4. | 72 | 87 | 28 | 62.5 | 77 | 12 |
| | AVERAGE 60 SEC. LEQ. | | 70.5 | | | 62 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 71.1 | | |

TABLE 21
NOISE MONITORING DATA

| STREET | STATION 25 | DATE 7/26/82 | DAYTIME(10:40) | | | NIGHTTIME(10:50 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | | LEQ | PEAK | TRAFFIC VOLUME |
| Churn Creek Road | Accross from Enterprise High School (School not in session) 1. | 60 | | 10 | | | | |
| | 2. | 60 | 85 | 16 | | | | |
| | 3. | 61 | | 12 | | | | |
| | 4. | -- | | -- | | | | |
| | AVERAGE 60 SEC. LEQ. | 61 | | | | 56 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 63.6 | | |

| STREET | STATION 26 | DATE | DAYTIME(10:50) | | | NIGHTTIME( ) | | |
|---|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | | LEQ | PEAK | TRAFFIC VOLUME |
| Churn Creek Road | Convalescent Hospital lot 1. | 58.5 | 80 | 12 | | 53.5 | 73 | 3 |
| | | | | | | 58 | 70 | 6 |
| | 2. | 59.5 | | 12 | | 54 | | 6 |
| | 3. | 62 | | 10 | | 56.5 | 75 | 7 |
| | 4. | -- | | | | 53.5 | 75 | 4 |
| | AVERAGE 60 SEC. LEQ. | 60 | | | | 55.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 63.0 | | |

| STREET | STATION 27 | DATE | DAYTIME( 9:30 ) | | | NIGHTTIME(10:58 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | LEQ | PEAK | TRAFFIC VOLUME | | LEQ | PEAK | TRAFFIC VOLUME |
| Cypress Avenue | at Lawncrest Cemetary parking lot 1. | 52 | 78 | 4 | | 44 | 75 | 1 |
| | 2. | 60 | 75 | 6 | | 52 | 70 | 4 |
| | 3. | 62 | 78 | 6 | | 48 | 72 | 2 |
| | 4. | 66 | 84 | 8 | | 52 | 70 | |
| | AVERAGE 60 SEC. LEQ. | 62 | | | | 45.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | | 60.5 | | |

TABLE 20
NOISE MONITORING DATA

| STREET | STATION 22 | DATE 7/19/82 | DAYTIME( 9:30) | | NIGHTTIME( ) | | |
|---|---|---|---|---|---|---|---|
| Bechelli Lane | C/O Loma Vista | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 54.5 | 81 | 6 | 52 | 65 | 1 |
| | 2. | 56 | | 7 | 49 | 65 | 1 |
| | 3. | 60 | | 8 | 46 | 62 | 0 |
| | 4. | | | | 51.5 | | 2 |
| | AVERAGE 60 SEC. LEQ. | 58.5 | | | 50 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 59 | | |

| STREET | STATION 23 | DATE | DAYTIME( 9:50) | | NIGHTTIME(11:15 ) | | |
|---|---|---|---|---|---|---|---|
| Hartnell Avenue | Rother Elementary School parking lot | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 63.5 | 80 | 19 | 52 | 70 | 2 |
| | 2. | 61.0 | | 13 | 53 | 70 | 3 |
| | 3. | 59.0 | | 10 | 54 | | 5 |
| | 4. | 59.0 | | 11 | 52 | | 2 |
| | AVERAGE 60 SEC. LEQ. | 60.5 | | | 53 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 61.6 | | |

| STREET | STATION 24 | DATE | DAYTIME(11:00) | | NIGHTTIME(11:23 ) | | |
|---|---|---|---|---|---|---|---|
| Interstate 5 | Between Parsons Junior Highschool and point 100 E/O I-5 outer lane | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| | 1. | 70 | 87 | 25 | 70 | 75 | 12 (11 trucks) |
| | 2. | 64.5 | 88 | 24 | 66 | 93 | 12 ( 6 trucks) |
| | 3. | 62.5 | 90 | 25 | 65 | 80 | 12 |
| | 4. | 71.5 | | 27 | 66 | | 10 |
| | AVERAGE 60 SEC. LEQ. | 68.5 | | | 67 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | | | 73.7 | | |

TABLE 22
NOISE MONITORING DATA

| STREET | STATION 28 | DATE 7/20/82 | DAYTIME( 9:45) | | | NIGHTTIME(10:20 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Victor Avenue | at Casa Cerina apartment 100' N/O Cascade Street | 1. | 53.5 | 81 | 2 | 47.5 | 69 | 2 |
| | | 2. | 58 | 78 | 5 | 50.5 | 72 | 5 |
| | | 3. | 61 | 81 | 8 | 46.5 | 75 | 2 |
| | | 4. | 61 | 77.5 | 6 | 48 | 75 | 5 |
| | AVERAGE 60 SEC. LEQ. | | 59 | | | 52 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | 60.3 | | | | | |

| STREET | STATION 29 | DATE 8/11/82 | DAYTIME( 9:57) | | | NIGHTTIME(10:30 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Hartnell Avenue | Between Victor Avenue and Kenco Street | 1. | 68 | 82.5 | 15 | 54 | 70 | 5 |
| | | 2. | 65 | 82 | 13 | 54.5 | 77 | 8 |
| | | 3. | 66<br>58 | 77 | 11 | 56 | 75 | 5 |
| | | 4. | 56<br>62 | 78 | 9<br>13 | 60 | 70 | 7 |
| | AVERAGE 60 SEC. LEQ. | | 64 | | | 51.5 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | 63.2 | | | | | |

| STREET | STATION 30 | DATE 7/29/82 | DAYTIME(10:40) | | | NIGHTTIME(10:30 ) | | |
|---|---|---|---|---|---|---|---|---|
| | | | LEQ | PEAK | TRAFFIC VOLUME | LEQ | PEAK | TRAFFIC VOLUME |
| Cedars | at 5221 Cedars (Church parking lot) | 1. | 52 | 74 | 2 | 40 | 56 | 0 |
| | | 2. | 45 | | 0 | 40 | 54 | 0 |
| | | 3. | 45 | | 0 | 42 | 54 | 0 |
| | | 4. | 45.5 | | 0 | 40 | 56 | 0 |
| | AVERAGE 60 SEC. LEQ. | | 48.1 | | | 40.6 | | |
| | CALCULATED CNEL FROM LEQ @ 100' FROM NEAREST LANE | | 49.2 | | | | | |

No. 525
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KANKAKEE, ILL.